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FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

Amphibious Aircraft

FROM the earliest days of flying, or at least from the time when the possibility of getting a flying machine into the air had been conclusively demonstrated, men have toyed with the idea of amphibious operation. This is natural enough, for nature's example is ever before us in the shape of water birds which use the land and the sea with about equal facility. So far, however, man has not succeeded in emulating nature without incurring a great deal more extra weight than that represented in water birds by the webs between their toes.

In this issue "Indicator" discusses some of the pros and cons of amphibious aircraft, and comes to the conclusion that the class will always be so much heavier than its landplane equivalent that it is unlikely it will ever come into general use. We also publish, somewhat appropriately, a brief article on a new American amphibian project which has merits, but the estimates for which appear to err on the optimistic side in the matter of weight.

Granted that for certain work it may be well worth while to sacrifice something for the ability to use water and land at will, it must always be the aim of designers to keep down the extra weight to an absolute minimum. We know of only one type in which there is practically no such extra weight: the helicopter. This can use plain cylindrical bags both on land and water. The Fairey Aviation Company many years ago reduced the weight problem by the simplest form of undercarriage, a plain wheel in the bottom of each float. This scheme worked, but it made the floats very "dirty" on the water, and it increased the take-off run quite a bit.

The problems are difficult, but there should be a fairly rich harvest for the firm which succeeds in reducing the payload sacrifice to tolerable proportions.

Preparedness

CHICAGO has taught us several things, at least so it is to be hoped, if we have the good sense to profit by the salutary lesson. The first was the extent to which the U.S. delegates came to the conference fully prepared down to the last detail. We left behind in this country the Director of Civil Aviation, whose task presumably became that of sitting at the end of a telephone to answer all the queries shot at him when information was wanted at the Chicago end of the line; or it may be that every morning when he arrived at his office (if indeed he ever left it) there was a stack of cable queries awaiting him.

America secured the right to send her commercial aircraft to any country which is willing to accept them under a bilateral arrangement, and American aircraft constructors were already prepared to tell potential future customers what will be offered in the way of civil types as soon as conditions permit. A lesson in preparedness which we should heed. Boeing's Stratocruiser, described in this issue, is one of the most impressive, not only on account of the claims made for it, but because the prototype military version of the commercial version of the Superfortress (it sounds a bit complicated, but that is what it is) has already flown. This machine was carefully timed to be announced during the Chicago Conference, as were several other types.

Lockheed announced the Saturn, a twin-engined 14-passenger machine cruising at over 200 m.p.h., and stated quite frankly that it will carry on the traditions of the Electra and is "expected to be extremely popular among airline operators of European and other countries whose services are over short distances with high frequency of flights." A great point is made of the economy of the design, such as by having horizontal

and vertical tail surfaces interchangeable. That was tried in this country by Mr. O. E. (now Sir Oliver) Simmonds in his Spartan many years ago.

Among new types already flying, which will have obvious civil application is the Fairchild C-82, a twin-engined twin-boom type in the 50,000 lb. class. This machine is already in production, and an example was shown at the Washington National Airport during the Chicago Conference. As a heavy freight carrier after the war it should find many uses.

If we turn to this country we look in vain for such signs of preparedness. Bristols have announced a freighter based on the Bombay, but that is some way off. Handley Page have told us about the Hermes, which is still in the design stage. At the annual meeting of Airspeed Mr. A. S. Butler referred to the Airspeed machine which this firm is to build (it is the A.S.57). It will carry up to 40 passengers. Then there is the huge Bristol, which obviously will not materialise for some years, and the Avro Tudor, again a small spot on the distant horizon.

British manufacturers are not to blame. Given the necessary priority they would not be found wanting, but their hands are tied and, apparently, their lips are sealed, as Baldwin said, and for no better reason.

Truly, as Lord Brabazon told Sir Archibald Sinclair some time ago, "we are being shouldered off the face of the earth." The sad part is that Whitehall does not seem to care.

Air to the Rescue

FORTUNATELY for the Allied troops in Belgium, four days of clear, bright weather supervened over the area covering the salient and supply lines of Rundstedt's offensive during the critical period at Christmas time. The result, as we forecast last week, was a major victory for the air forces over the German ground forces. At the same time we cannot help thinking what the outcome might have been had air help been denied to the Allied armies for another week.

Rundstedt certainly made a great effort, and it may be that he has sufficient armour and supplies for another try, either in the same area or elsewhere on the battle-front. The fact remains, however, that if, for any reason whatsoever, he decides to put supply columns on the roads by day to advance, retreat or just to supply his static positions, our tactical air forces will do more damage and cause more losses than any opposing land force could hope to do in the same period of time.

In the favourable four days of last week over 4,000 vehicles of all sorts, both soft and armoured, were destroyed. As our Typhoons, with armour-piercing rockets, went in to attack the German tanks, the crews were seen to leave the tanks and run for cover.

Bomber Command also became, for the moment, a tactical weapon and was given the job of helping the U.S. 8th A.A.F. destroy the rail approaches to the battle area. The *Luftwaffe* put in an appearance in greater strength than for some while. On one day it managed to fly nearly a thousand sorties. It sustained losses in the ratio of over two to one suffered by the Allies and never looked like gaining air superiority, let alone air supremacy, over the battlefield. How true is Field Marshal Sir Bernard Montgomery's dictum that air superiority at the very least is essential before a land battle can be begun with any hope of winning.

The fortunes of this present battle have swayed exactly in relation to the state of the weather and, therefore, to the amount of air power which could be deployed. It is to be hoped that our generals will learn this lesson well and will realise that a great and mighty tank attack can, in most circumstances, soon be turned into a bloody shambles by rocket-firing aircraft.

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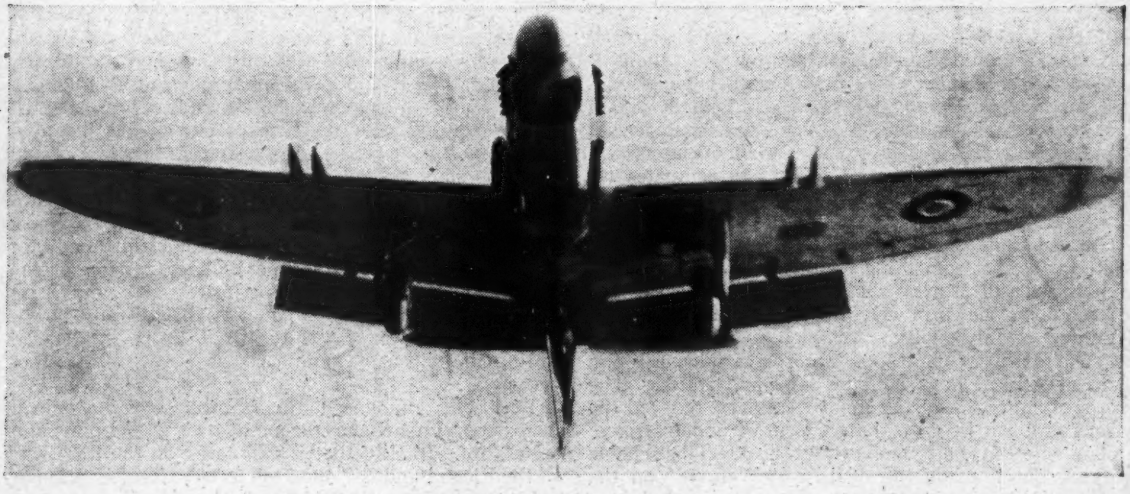


COMING OVER THE ROUND-DOWN: A Fairey Firefly, the Fleet Air Arm's latest two-seater fighter, comes in to alight. Wheels and arrester hook are, of course, down and the Youngman flaps are in the position giving the maximum lift and drag. The orifices which appear just below the Rolls-Royce Griffon II engine exhaust stubs are the port and starboard air intakes to the carburettor.

WAR in the AIR

Santa Claus' Weather : Rundstedt Feels Our Air Power : Blows at the "Under-belly" : Pacific Aggression

UPSETTING THE TIMETABLE : Thunderbolt fighter-bombers of the Ninth U.S.A.A.F. attacking a German supply train bound for the Third Army front. Some of the waggons are derailed and the engine is blazing.

IN the first stage of Rundstedt's great counter-attack on the Allied lines in Holland the weather favoured the Germans—even as early mist favoured the start of Ludendorf's attack on Gough's 5th Army on March 21st, 1918. For days on end the Allies got no advantage from their superior air power, as the weather reduced flying to a minimum. Santa Claus, however, gave the Allies a welcome Christmas present in the form of several days of bright frosty weather.

At once the air was filled with the deep-toned note of aircraft engines as every class of machine hurried up to take up its own appropriate task. The fighters and fighter-bombers of the Tactical Air Forces sped along above the roads looking for German supply vehicles and reinforcements; and sometimes they found them massed bumper to bumper. The medium bombers ranged further afield. The Spitfire-bombers sought out buildings in Dutch towns connected with the business of rocket shells. The heavies, both of Bomber Command and of the 8th Air Force, went for the railway centres and marshalling yards behind the German lines.

Naturally the slaughter of vehicles on the roads was great at first, and many tanks also felt the blow from the air and had to stay put. Soon, however, the roads began to clear by day, showing that the Germans had been driven back on to movements by night. Tanks and other vehicles were found by the Americans deserted on the roads, not in the least damaged, but with empty petrol tanks. Nothing proved more conclusively than that the value of their air power to the Allies. Further evidence of petrol shortage was seen in the fairly extensive use of horse-drawn carts by the Germans.

It had been said that the *Luftwaffe* had been carefully saved up for this battle, and certainly more German aircraft put in an appearance than had

SECOND WIND : Long-range tanks fitted to 2nd T.A.F. rocket-Typhoons before a raid on targets in Hanover. This represents a penetration of over 120 miles behind the front line.

WAR IN THE AIR

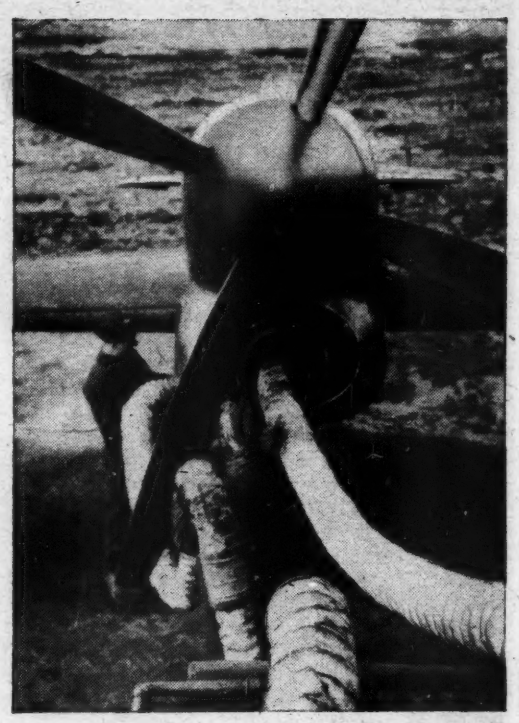
been met by the British and Americans for a long time before. But its effect was inconsiderable. Formations of 50 machines were seen here and there; but they could do little against the overwhelming numbers of the British and Americans. In fighting quality, too, nothing happened to upset the verdict of the Battle of Britain, when the R.A.F. was outnumbered but still mastered the *Luftwaffe*. Sir Arthur Tedder must have had a very busy time arranging it all; but he is used to busy times, and all went well—though he must have longed for the help of the lamented Sir Trafford Leigh-Mallory.

Long-term policy was not neglected while this mighty battle raged, though Bomber Command and the 8th Air Force had, quite rightly, to concentrate their efforts on Rundstedt's rear. General Spaatz has another string to his bow, in the 15th Air Force based in the Mediterranean. It made its contribution by attacking oil plants and other targets in Austria, which might have tried to top up the waning supplies of fuel in the Battle in the West—the Rhine Battle seems an appropriate name for it, for when the German attack finally fails the Allied riposte should carry General Eisenhower's men up to the Rhine, and perhaps across it.

Budapest Surrounded

THE Russians celebrated Christmas week by completing the encirclement of one enemy Capital, Budapest. Hungary is now the last satellite which clings to Germany's coat-tails; but we may remember that in the first world war the Austro-Hungarian Empire was an equal partner and Ally of Germany, and that Budapest was one of its two main Capital cities. Vienna alone took some sort of precedence of it in what some British statesman called the "ramshackle Empire," and now Vienna is not the Capital of anything. Something will have to be done about that when Hitler's régime is over.

As usual, the Russian Air Force is the silent service, but correspondents have told how the Russian aircraft have been diving at the guns placed in the parks of Budapest. We may speculate also as to whether the mastery which the Russian Generals have shown over the Germans in manœuvre and surprise has not been largely due to the Red command of the air. Marshals Malinovsky and Tolbukhin seem to have known at all stages where their opponents were, and therefore what they were likely to do; while the German Generals appear to have been enveloped in the fog of war. Air superiority can make that difference.



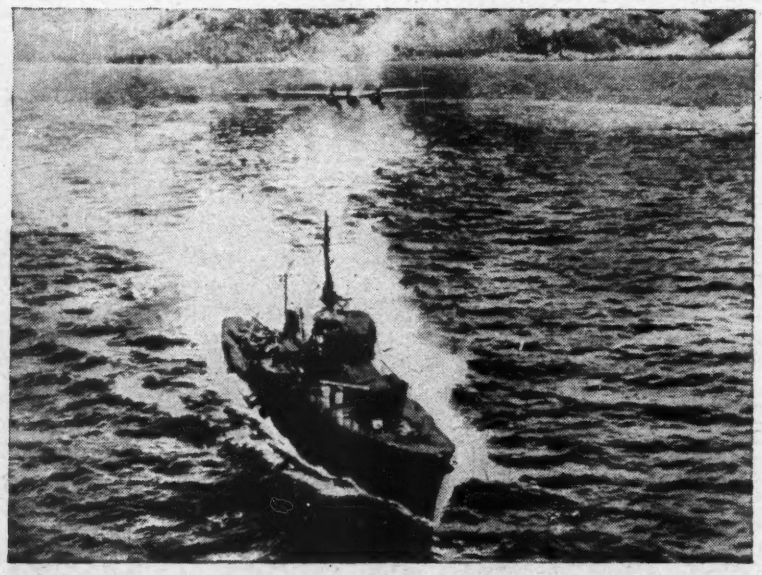
TURNING ON THE HEAT: Using hot air to warm up the Napier Sabre of a Typhoon during intense cold weather in Holland.

On December 27th Tokyo was bombed once more by Superfortresses based on Saipan. The attack took place at noon, and seems to have made a great impression on the Japanese, judging by the fairy stories they put out about the damage which they said they had inflicted on the raiders.

The U.S. Pacific Fleet has made another combined sea-air attack on Iwo Jima, in the Volcano Islands, which are half-way between the Marianas and the Japanese homeland. Added to this, the U.S. Navy has announced 27 new sinkings of Japanese vessels by submarines. One of the victims was a large aircraft carrier, the first of its kind to be sunk by a submarine.

The British Navy likewise has not been idle in eastern waters. Not long ago it made a sea-air attack on Japanese positions at the western end of Sumatra. On the morning of December 20th, it has recently been announced, it sailed further afield and attacked the harbour of Belawan-Deli on the east coast of that great island, and also went for oil installations in the area. No mention has been made of fire by the guns of the ships; the whole attack was apparently carried out by aircraft. Avengers, bombing from 1,500 feet, scored hits on jetties, warehouses and railway yards. Fighters meanwhile set fire to an oil tank and a petrol tank. The weather was bad, and flying was difficult, and results could not be fully observed. One enemy bomber was shot down by a Hellcat.

That was not a bad morning's work; but in the afternoon airfields in



EVASIVE ACTION: A Japanese destroyer jinking to avoid bombs from an attack by U.S. Mitchells on enemy shipping in Ormoc Bay, Leyte.

WAR IN THE AIR

the Sabang area and the anchorage at a place called Uleelhoe were attacked by Corsairs and Hellcats. The British force suffered no casualties.

The Japanese last week made their first surface attack on the Americans on Mindoro island, in the Philippines, but as the ships were approaching from the direction of Luzon they were spotted by a U.S. Navy Liberator. It reported that the enemy force comprised a battleship, a heavy cruiser, and six destroyers.

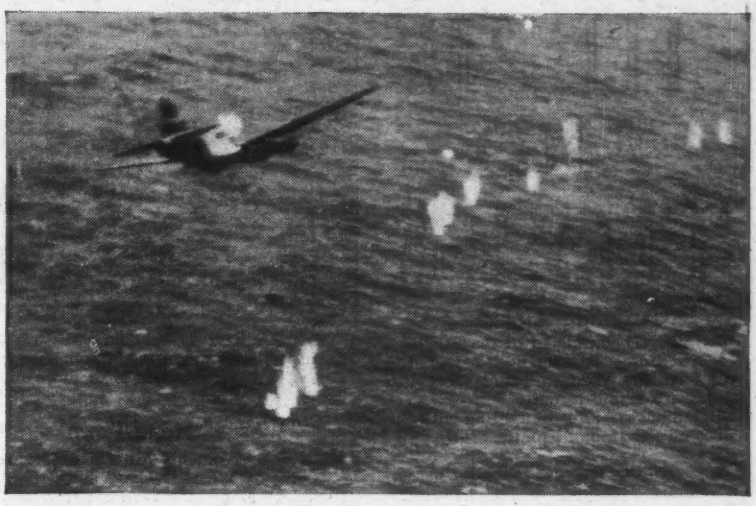
Bombers and fighters were quickly despatched to attack the enemy, and torpedo boats were also rushed up. The battleship and the cruiser were both damaged by bombs, and three of the destroyers were sunk. Thereupon the Japanese prudently retired.

The absence of an aircraft carrier from this attacking force is worth noticing. Japanese losses in that vital class of warship have been very heavy, and possibly the supply is now running short. A carrier is not built in a day, and the Japanese shipyards are not the most efficient in the world. In any case the Japanese goose is only waiting to be cooked; if the yellow enemy now has to admit inferiority in the air side of its naval power, the final roasting should not take very long.

An Admiral's Opinion

ADMIRAL SIR BRUCE FRASER, G.C.B., K.B.E., the C.-in-C. of the British Pacific Fleet, who is flying his flag in the new battleship H.M.S. *Howe*, has recently visited Admiral Nimitz at his headquarters at Pearl Harbour. On his return he made the following pronouncement: "I am in full accord with the American strategy of using large numbers of aircraft carriers. The country with the greatest sea-power must win the war. We have that sea-power. The Japanese are losing theirs."

Those are the sentiments which have been consistently expressed in *Flight*, and it is gratifying to find the British naval C.-in.-C. in the Pacific concurring. Carrier-borne aircraft reduce the handicap of enormous distances in the Pacific Ocean, and in sea fights the American carrier aircraft have shown themselves capable of winning a battle on their own. We feel confident that the officers and men of the Fleet Air Arm will prove in no way inferior to their American brothers-in-arms. When the time comes for secrets to be revealed, it will be very interesting to learn which carriers have been allocated to the British Pacific Fleet.



ON THE WAY IN: A twin-engined Mitsubishi "Betty" falling into the sea after being set on fire by a U.S. Navy Liberator.

The great battle in the West has reached a state (as we write) when the military commentators are anxiously asking themselves, "Who does what next?" The R.A.F. and its American colleagues have no doubts. Whenever the weather permits flying their machines go off to strafe the Huns. One muster of enemy troops and armour in a valley near the town of Bastogne was attacked by Lancasters just before dawn on the last day of 1944. In that narrow valley it is not thought possible that the Germans could quickly disperse.

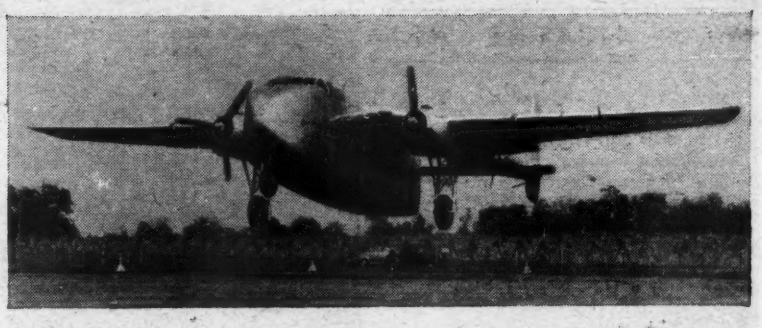
The close of the year was also marked by a series of raids by the U.S. 8th Air Force on oil plants which we do not remember to have heard mentioned before, but which have evidently gained importance recently as the better-known plants have been heavily damaged, one after another. Nearly the whole of the Allied air effort has been directed towards depriving the German Army of the means of carrying on the battle. But a foggy day gives the enemy a chance to get a mass of stuff up to his firing line without interference—except from artillery shelling blindly at the roads.

On New Year's Eve Berlin was bombed by the strongest force of Mosquitoes ever sent there.

The Gestapo H.Q. in Oslo was also attacked, by daylight, on the last day of the year. An attack on these H.Q. on September 25th, 1942, was the first introduction of the Mosquito to the British public. This time the leading machines hit the building and set it on fire, and the remaining Mosquitoes, unable to see the target clearly, came home with their bombs in their racks.

BATHING THE CAT: The fire-fighting squad on the U.S. carrier *Cowpens* putting out the flames of a Grumman Hellcat which was already on fire before it landed.

HERE AND THERE



THE PACKET is the name bestowed on this Fairchild C-82, a twin-boomed transport (two 1,600 h.p. Double Wasps) designed primarily for post-war business. Loaded weight is about 40,000lb. and top speed about 200 m.p.h.

Brazilian Airmen

A SECOND contingent of the Brazilian Air Force is shortly to join the Allies on the Western Front, said Rio de Janeiro Radio recently.

Brazilians are already fighting with the Allies on the Italian Front.

American Jet Engine

THE first American-designed jet propulsion aircraft engine has been developed for the Navy Bureau, announced Mr. George Bucher, chairman of the Westinghouse Electric and Manufacturing Company last week. He claims that the engine is "expected to produce more pounds thrust per given amount of weight than any engines brought to America from abroad."

Trade Appointment

ENGLISH STEEL CORPORATION, LTD., announce that Mr. F. Pickworth, F.C.I.S., has been appointed managing director of the corporation and its subsidiaries, the Darlington Forge, Ltd., and Industrial Steels, Ltd. Mr. F. S. Beale, A.C.I.S., at present assistant secretary, is appointed secretary of the corporation.

Capt. Acland Resigns

IT is announced that Capt. P. D. Acland, managing director of Percival Aircraft, Ltd., since 1940, is severing his connection with that company. It will be recalled that the shipowning firm of Hunting and Son, Ltd., recently acquired control of Percivals.

Other companies in the Hunting group are Hunting Aviation, Ltd., Hunting Aerosurveys, Ltd., and Field Consolidated Aircraft Services, Ltd.

Junior Artist Wanted

A VACANCY now exists in the artists' department of Iliffe and Sons Ltd., Dorset House, Stamford Street, London, S.E.1, for a junior technical artist aged 17 years or over.

Applicants must not be eligible for call-up and should live, or be prepared to live, in or near London. All applications should be made by letter, enclosing specimen drawings of mechanical subjects.

Glasgow R.Ae.S. Elections

MAJ. F. A. BUMPUS, managing director of the Blackburn Aircraft Co., Ltd., was elected president of the Glasgow branch of the R.Ae.S. at their first annual meeting held just before Christmas.

Other officers elected were: Mr. Robert McIntyre (chief designer, Prestwick Airport), chairman; Mr. G. F. P. Fox (material engineer), vice-chairman; Mr. David B. R. Briant, secretary; and Mr. E. Loveless (chief stressman), treasurer.

"Wasps" Stand Down

THE U.S. Women's Air Force Service —the "Wasps"—have now been ordered to stand down after two years' duty with the U.S.A.A.F. at home, and it is reported that during that period they have flown more than 75,000,000 miles.

Their "Queen Wasp," Miss Jacqueline Cochran, explained that they were being released because the shortage of male pilots which existed in 1942 had now been "effectively corrected."

New Argentine Factory

A NEW factory for the production of civil aircraft was recently opened in the Argentine by the *Sociedad Industria Metalurgica y Plastica Argentina* (more briefly known as *Impa*).

The inaugural ceremony, attended by Col. Juan Domingo Peron, the Argentine Vice-President, and members of the Government, was marked by a flying demonstration in which gliders and "new types of aircraft built in the factory" took part.

Tempest Squadron's Hundredth

A HOLLAND-BASED Tempest squadron of R.A.F., 2nd T.A.F. has just scored its century of enemy aircraft destroyed. This has brought a telegram of congratulations from the 2nd Army, "Congratulations on your Hundredth Hun. The faster the better."

Pigeon's Record Flight

A YOUNG pigeon of R.A.F. Pigeon Service has created what is believed to be the world's record pigeon flight. Sent to Gibraltar with a number of young companions to replenish the lofts, he was left to resettle, but preferred home, flying back to Gillingham, a distance of 1,090 miles.

Bred during 1944, the pigeon had previously flown 300 miles west of his Kentish station. He has been christened "Per Ardua."

French Air Industry Busy

ALTHOUGH materials and skilled labour are scarce, France is already getting her aircraft industry going again and 400 factories are reported to be already working, employing at least 23,000 machine tools.

A new Government-controlled air company is being formed to take over Air France, and eighteen main airfields are to be prepared without delay, with another fifty secondary ones to come at a later date.

Five-star Generals

CREATION of the new U.S. rank of General of the Army, the equivalent of a British Field Marshal, is reported to have raised the problem of how to find room for five silver stars on a normal shoulder strap. It just couldn't be done, it seems.

So the new five-star generals will denote their rank by five little "pips" only ⅜in. across, set in a circle. We haven't had the privilege of meeting one yet, but the official description of the new type of star is "plain, raised, and rounded."

A Miles' Innovation

A BLIND shorthand-typist employed by Miles Aircraft, Ltd., has produced in Braille a summarised version of the firm's wall newspaper. This will enable their other blind workers to keep abreast of current affairs and to participate to a fuller extent in the general activities.

With its success established after the first issue, the question of obtaining the requisite number of monthly copies has been taken care of by Sir Ian Fraser, chairman of the executive council of St. Dunstan's, and the National Library for the Blind.

Rocket-firing Mosquitoes

MOSQUITO aircraft are among the R.A.F. types using rocket projectiles, it was recently disclosed by the Air Ministry.

The fact was mentioned in an account of how Mosquitoes of Coastal Command had attacked enemy shipping off the Norwegian coast "with six-pounder cannon and rockets," leaving two merchantmen on fire and one of them sinking.

It was not clear from the message if both types of offensive armament were fitted to each aircraft taking part, or if some were the Mark XVIII armed with a six-pounder and four 0.303in. machine guns, while others were of an unspecified mark equipped with rockets as their chief weapon.

Polish Appreciation

THE wings of the Polish Air Force were recently presented to the captain and leading members of the aircrew of the R.A.F. Transport Command aircraft which carried the Polish Prime

HERE AND THERE

Minister and C.-in-C. to Moscow, as a gesture of appreciation.

Other members of the aircrew received badges appropriate to their service, and the steward was presented with a gold and silver cigarette box bearing the engraved signatures of all the passengers.

Honorary Members

BOMB-CARRYING Spitfires of the 2nd T.A.F. operating on the Western Front have been nicknamed "Honorary Members of Bomber Command" by the troops to whom they are giving close support, says an official news bulletin.

Each Spitfire carries a 1,000 lb. bomb load, and the Wing led by Wing Cdr. R. H. Harries, D.S.O., triple D.F.C., has just celebrated the completion of its first year as a bomb-carrying fighter force.

The Cup That Cheered

A WELLINGTON of R.A.F. Transport Command in the Middle East was recently saved from a crash landing by a flask of tea!

The pilot, F/O. E. F. Riddell, of Hinckley, found that his undercarriage would not lower owing to shortage of hydraulic fluid, and seeing a flask of tea, ordered some of it to be poured into the reservoir.

This provided sufficient increase in pressure to operate the landing gear and the Wimpey made a normal landing.

Tiny, but Tough

A "MIDGET" Australian aircrew serving with Coastal Command in the Mediterranean has recently completed its first operational tour and is now to have a spell in a non-operational zone.

The average height of the crew members is only 5ft. 5in., and the average weight 10 stone. The captain, F/O. L. Bridges, of New South Wales, is only 5ft. 3in. tall, and is known to the rest of the squadron as "The Gremlin."

English crews in the same squadron, it is said, claim that the midget crew's aircraft was faster than theirs because it had practically nothing but its bombs to carry!

New American Bomb

MORE than 4,000 tons of a new type of American fragmentation bomb were dropped in one day by the U.S. Eighth Air Force during "softening up" air offensive along the Rhine, it was disclosed recently by Colonel Philip Schwartz, armament chief of U.S. Air Service Command.

The bombs weigh 265 lb. each and contain T.N.T. wrapped in wire halix. On exploding they scatter a maximum quantity of lethal fragments among Germans on heavily fortified positions in front of our troops.

They are being used in ever-increasing quantities.

"They're on the new hush-hush job."

CROPPED: Despite losing nearly half his Rotol blades through a spot of "negative altitude" over the Bristol Channel, the pilot got this Spitfire back to base.

Led a Friend In

FLT. LT. J. R. MACELWAIN, of St. John, New Brunswick, a Spitfire pilot of R.A.F. 2nd T.A.F., recently saw a Lancaster in distress over the enemy lines in Holland.

Two of the heavy bomber's engines were dead and the aircraft was losing height rapidly.

The Canadian fighter pilot flew up alongside, waggled his wings, and led the crippled bomber safely to his own airfield, where it made a crash-landing.

"Then I discovered that the Lancaster pilot was an old Dutch pal of mine," the Canadian pilot stated. "Only a couple of weeks before we had been having a drink together at one of the Services clubs in London."

Well-earned Rest

WITH 139 "ops" to her credit, Bomber Command's record-breaking Lancaster, "M2," has now been placed on reserve and is approaching her retirement.

She first flew on April 17th, 1943, and did her first mission to Dortmund the following month. Altogether she has been 97 times to Germany, including 15 to Berlin, five times to Italian targets, and 37 times to other places.

This represents a total of 969 operational hours, during which "M2" has consumed 193,000 gallons of petrol.

Rescue by Parachute

NORTH-WEST Air Command of the R.C.A.F. recently announced the existence of a parachute search and rescue division for operation over the wild country between Edmonton and Whitehorse (Yukon Territory). This, it is believed, will more than double the chance of survival for crews of aircraft forced down in this inaccessible and inhospitable region.

The "para-searchers" have had specialised first-aid and medical training and can even administer blood plasma if necessary. They also carry two-way radio equipment and food supplies, and wear special protective suits, crash helmets, and cages to protect their faces.

The aircraft in this unit, the only one of its kind in the R.C.A.F., are fitted with four litters and oxygen equipment.

Canadian War Effort

SOME striking figures showing the extent of Canada's war output are contained in a 400-page booklet issued by Mr. C. D. Howe, their Minister of Munitions and Supply, just before Christmas.

These include nearly 11,000 aircraft, nearly 1,000,000 machine guns and small arms units, and 3,000,000,000 (three billion) rounds of small arms ammunition, besides cargo vessels, armoured naval craft, armoured fighting vehicles, and mechanical transport units by the hundreds and thousands.

Steel production has been doubled to a present annual total of 3,000,000 tons, and coal output increased by more than 2,000,000 tons since war began.

Less than 30 per cent. of all this goes to Canada's own armed Forces, the rest going to other members of the United Nations.

The booklet gives hints on how this industrial effort may eventually be switched to peacetime needs with improved transport services.

D

De Havilland Mosquito X

Pressure Cabin for 36,000 feet : 4,000 lb Bomb for Ground Le

1. GOING UP : Over a carpet of strato-cumulus a Mk XVI climbs toward the cirrus region which is its happy hunting ground.

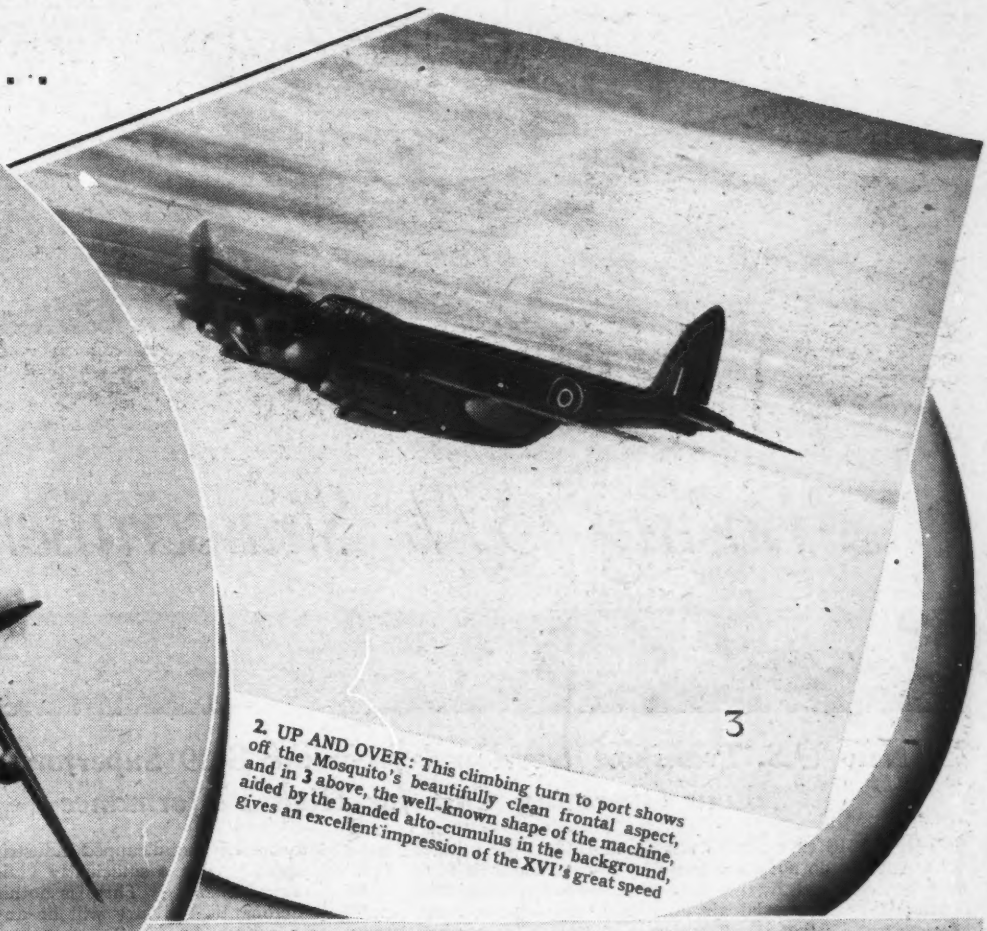
THESE recently released photographs of the new Mosquito XVI amplify the story of the Light Night Striking Force of Bomber Command (*Flight*, December 28th), who use the machine.

Designed to operate at altitudes of the 36,000ft. order, the Mk. XVI is fitted with a pressurised cabin, the interior pressure of which is maintained at 2 lb./sq. in. above the atmospheric pressure at which the aircraft is flying. Cabin air supply comes from a supercharger unit fitted to and driven from the port engine, the air being warmed before entering the cabin ; this measure assists in keeping the cabin temperature at a pleasant level and, further, helps the crew physiologically.

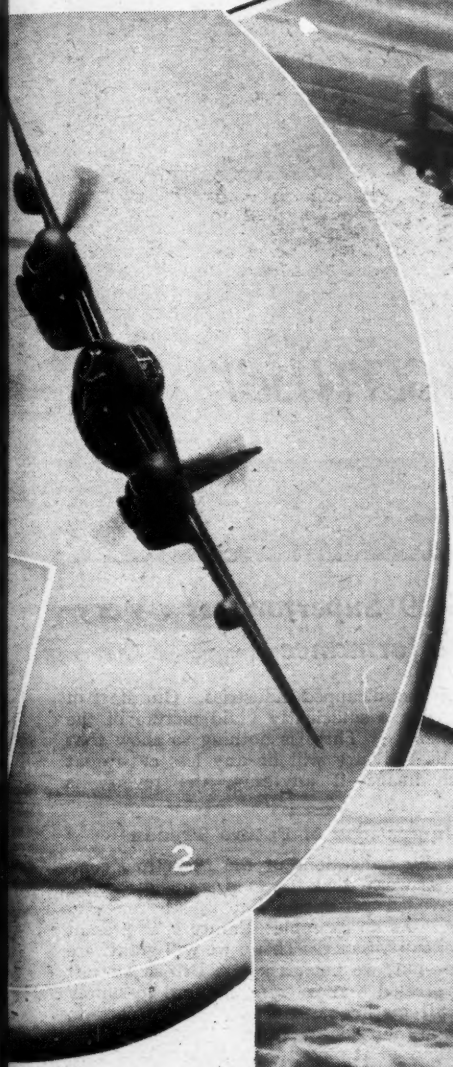
Under normal operation neither pilot or observer use oxygen masks, although these are carried in case the cabin is punctured by *flak* or bullets. Normal leakage of about 30 cu. ft./min. prevents the cabin air from becoming vitiated.

The engines are a Merlin 72 (starboard) and a 73 (port), each of which develop over 1,650 b.h.p. Long-range drop tanks beneath the outer wing panels give the bomber a range in excess of 1,500 miles, and these tanks are interchangeable with bombs.

tXVI.....

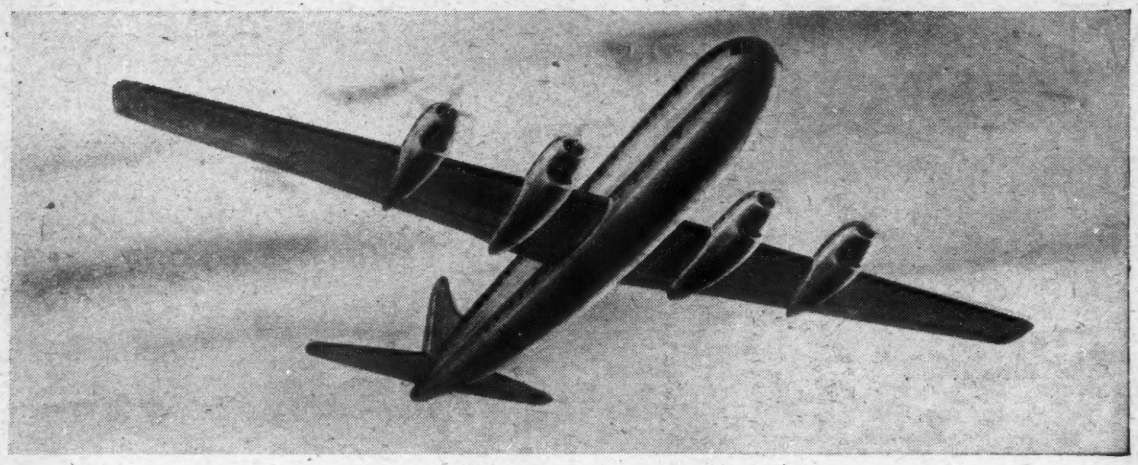


2. UP AND OVER: This climbing turn to port shows off the Mosquito's beautifully clean frontal aspect, and in 3 above, the well-known shape of the machine, aided by the banded alto-cumulus in the background, gives an excellent impression of the XVI's great speed



4. PLAN VIEW ; Here we can see the projection of the oil and coolant radiator intakes in the centre - section leading edge, a location which is highly efficient both from the aspects of cooling and of aerodynamic drag. Also can be seen the doors of the bomb-bay which bulge out from the normal fuselage contour.

5. WHO GOES HOME ? Bomb gone and course set for base, a Mk XVI flashes home in the icy air, its lovely shape silhouetted against the sun.



Boeing 377 Stratocruiser

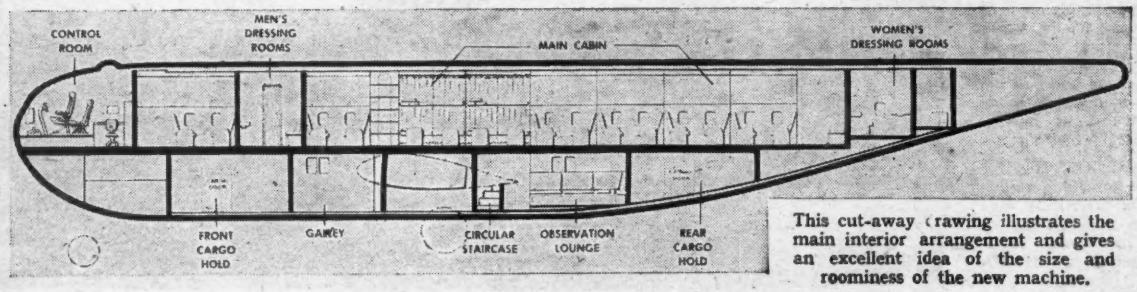
A New U.S. Transport Developed from the B-29 Superfortress : Very Low Operating Cost for High Performance

EMPHASIS that our friends on the other side of the Atlantic do not allow grass to grow under their feet is evidenced by the fact that they have already developed a commercial air liner from the famous B-29 Superfortress—what is more, the "military" prototype of the new machine has been built and is at present undergoing test. Boeings say that "all present models of the 377 will be for military service," but nevertheless this should not blind anyone to the fact that the Americans have the first of the greater post-war super-transport aircraft *already built and flying*. What is more, the Stratocruiser is a larger and more commodious and higher-powered aircraft than our British Tudor and Hermes which, one may reflect, are not yet built.

We have no doubt whatsoever that if the Government would authorise M.A.P. to give our aircraft manufacturers *carte blanche*, (within the limits of war requirements) to produce the sort of post-war commercial aircraft they want to produce, then, within a year, we could have flying at least two, probably three, world-beaters. In the face of the sort of competition of which the new Stratocruiser gives concrete evidence, it is essential that this country of ours gets off to a start which will not penalise further our already heavily handicapped industries. Our start of this war should paint a sufficiently vivid picture of the costs of unpreparedness. There is nothing to show that post-war aeronautical rivalry will be any less cut-throat than its wartime image—if anything, the reverse is indicated.

Present Indications of Future Trends

There are so many indications of the peacetime commercial trend of the world that it would seem impossible for anyone of unveiled perception not to see the way things are heading. As an example: France is at present eager to buy American aircraft. These, we will grant, are military machines—but, we must ask, are British aircraft manufacturers so pressed that we cannot afford to supply France with aircraft for her needs? We do not need to ask if our aircraft are inferior to American types. But if France is prepared to go at once to America for her military aircraft, is there any reason why she should not do the same thing for her commercial machines? Unfortunately the answer is No. America has more to offer than we have, and we have no reason to believe that we can give the U.S. *any* start she wants and still beat her. We



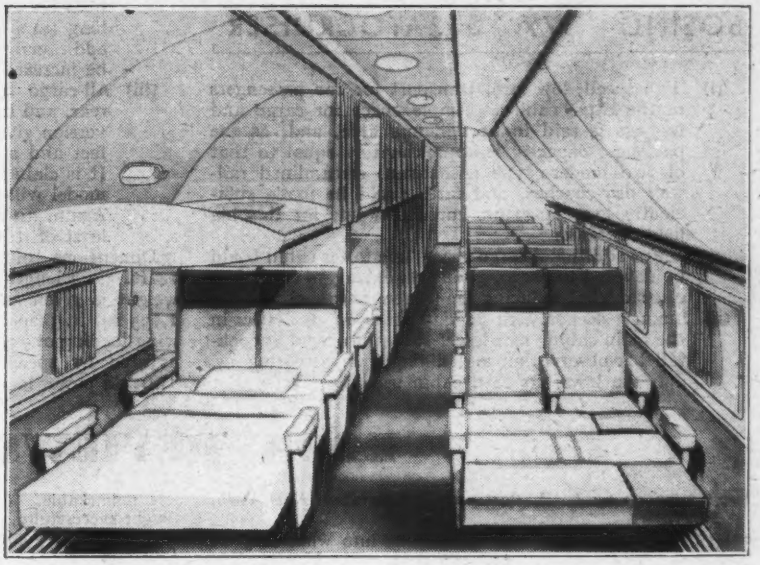
This cut-away drawing illustrates the main interior arrangement and gives an excellent idea of the size and roominess of the new machine.

BOEING 377 STRATOCRUISER

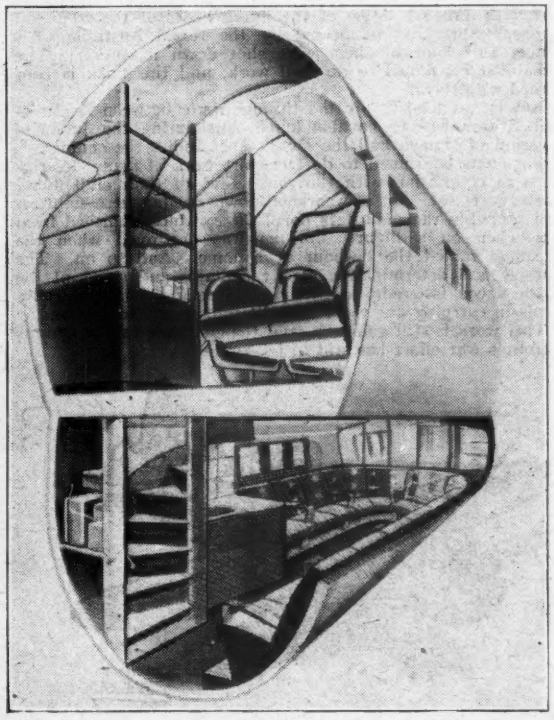
must repeat: in the face of the sort of competition of which the new Stratocruiser gives evidence, we cannot afford to rest on our laurels. There is no such thing as loyalty in commercial warfare—a bitter lesson which, seemingly, many people have yet to learn.

The new Boeing machine is a direct development of the Superfortress, having the same wings, tail unit, and landing gear, but, following the Avro precedent, has an entirely different fuselage which is 12ft. longer and of more than double the volume of the B-29's. Many outstanding claims are made for the aircraft, and presumably, justification for the operative figures advanced has been given by actual test—it is to be hoped that such is the case, as a great deal can be evolved by judicious use of a slide-rule and a little wishful thinking.

Nevertheless, the direct operating cost is quoted as being 1 cent (0.557d.) per passenger/mile for ranges of the 3,000-mile order. This passenger/mile cost is an almost ridiculously low figure, and we must assume that by the phrase "direct operating cost" Boeings mean the bare running cost without regard for the cost of maintenance, crew salaries, nor any of the other multifarious charges consonant with the operation of commercial aircraft. However, no matter whether the figure *is* but the bare running cost, it is still a very low one and, furthermore, one that would appear difficult to match, let alone beat.



The upper berths in the main cabin are, during the day, apparently stowed behind arcuate segments of the ceiling. At left can be seen how lower berths are made up on the specially arranged seats.



A spiral staircase joins the cocktail bar—observation lounge with the main cabin on the upper deck. Overall fuselage depth is 15ft. 9½in.

On top of this, the Stratocruiser is claimed to have a normal cruising speed of 340 m.p.h. with a maximum of 400 m.p.h., and an operating range (with "abundant" fuel reserves) of 3,500 miles. This would allow non-stop flight between New York and London or New York and Los Angeles without difficulty, and at a speed faster than the economical cruising speed of a Mosquito!

The performance is made possible, according to the makers, by virtue of the Boeing 177 low-drag wing and other aerodynamic advancements already proven on the Superfortress. Engines are said to be of 2,800 rated horsepower with 3,500 h.p. for take-off, and although mention is not made of their make, one may hazard a guess that on the Boeing precedent of the Fortress, Clipper, Stratoliner and Superfortress, they will be the new 18-cylinder units recently announced by Wright. Flight on three engines only is claimed to be possible at 20,000ft.

Pressurised, Two-deck Fuselage

As the machine is intended for operation at altitudes up to 30,000ft., the fuselage, except for the lower rear cargo compartment, is pressurised to a value equivalent to atmospheric pressure (but not temperature) at 8,000ft. For descent, regardless of the aircraft's rate of descent, the cabins' pressure is increased at a slow, measured rate in order to maintain passenger comfort.

Precedent for the two-deck fuselage arrangement is given in the Curtiss-Wright 20 model, but Boeings have gone rather further—as, of course, the size of their aircraft allows them—and utilise both decks for passenger accommodation, the floor which spans the inter-section of two eccentric circles which make the fuselage cross-section providing a strong lateral tie against internal pressure. Pressure difference between 8,000 and 30,000ft. is no less than 6½ lb./sq. in., which, when acting over the entire area of the fuselage surface, gives a total of a good many tons, and there is no doubt that the tie provided by the floor of the upper deck is a very valuable stressing quantity. The lower section has a diameter the same as that of the B-29, whilst the upper section is somewhat larger with a diameter of 11ft.

Boeings claim that the two-deck layout, by allowing three cabins, permits unusual flexibility in arranging the aircraft to meet various operational conditions. Three alternatives are listed:—

BOEING 377 STRATOCRUISER

(i) High speed, low fare, transport for 100 passengers in the three cabins. Ample space for cargo and luggage is said to be still available, and, as the passenger capacity is approximately equal to that of two modern-type (American) streamlined railway day-coaches, and fares could be made sufficiently low, operators could compete for this big field of traffic.

For additional cargo space, one lower cabin could be devoted to cargo, giving an extra 750 cubic feet of space, but reducing the passenger capacity to 86.

(ii) Luxury sleeper with 72 day seats or 36 berths in the main cabin; rear lower cabin furnished as cocktail bar-observation and dining lounge seating 14, and the lower forward cabin used as galley, crew quarters and cargo hold. This arrangement is for long trans-ocean flights. By using the lounge for additional passengers, the day-time capacity could be increased to 86.

(iii) All-cargo transport with a drive-up ramp to the rear, and internal cargo-handling equipment. This version gives a usable cargo volume of 3,000 cubic feet and a maximum cargo payload of 35,000 lb. It is claimed that the direct operating cost of this model will be about 5 cents (2.8d.) per ton/mile. Again, an amazingly low figure which, to say the least of it, appears optimistic.

Dimensions of the Stratocruiser are: Wing span, 141ft. 3in.; length, 110ft. 4in.; height, 33ft. 3in. All-up weight is given as 130,000 lb., and with a wing area of 1,735 sq. ft. (aspect ratio is 11.5) this gives the very high wing loading of 74.9 lb./sq. ft., but take-off is presumably assisted by special flaps as used on the Superfortress. Take-off power loading would be 9.28 lb./h.p.

BOOK REVIEWS

Aerodynamics: by L. R. Parkinson. Macmillan, New York, $2.25.

THIS book is of that class which falls into what may be called the "technical limbo," that is, it goes a trifle further than a purely elementary work and yet lags well behind the actual textbook standard.

So far as it goes, this book presents basic elements of aerodynamics in a clear and concise manner, but, on the other hand, everything it contains can be found in other established works together with a great deal which is not to be found in this book.

We cannot help but feel that there is little public for such a book as this, at least in this country; in the U.S.A. it might sell like hot cakes. Certainly, for anyone who wishes to obtain a brief, synoptic understanding of aerodynamic basic practice, it is quite useful, but it is only on such grounds that it can be commended.

Elementary Aerodynamics, by N. A. V. Piercy, D.Sc., M.Inst.C.E., F.R.Ae.S., M.I.Mech.E., English Universities Press. 21s.

THE full title of this book is: *A Complete Course in Elementary Aerodynamics with Experiments and Examples*, and it is, in our opinion, the best example of its kind we have had the opportunity to examine. Dr. Piercy is Reader in Aeronautics in the London University and Head of the Department of Aeronautics at Queen Mary College, and he was principal consultant for the Aerodynamics Department memorandum of the report of Sir Roy Fedden's Interdepartmental Committee on the College of Aeronautics (*Flight*, Nov. 16th, 1944).

Despite the technical erudition of the author, this book presents its subject matter in full accordance with the tenor of its title, and in no sense does the reader get the impression that he is being treated didactically. It is a work that we can recommend without reservation as being extremely valuable both as a comprehensive elementary course in aeronautics and as a useful text-book.

The Air Battle of Malta. H.M. Stationery Office, 1s. nett.

IT remains for historians to decide whether the Battle of Britain or the Battle of Malta was the more remarkable. They were not similar in all respects: for, whereas in the Battle of Britain a purely defensive fight was waged by Fighter Command, with the unseen help of British sea-power in the Channel, Malta, though frequently forced on to the defensive, was always a potentially aggressive base, whose task in the war it was to prevent supplies from Italy and Sicily from reaching the Axis forces in Africa. That was why the Axis tried so hard to subdue the island, and why their failure to do so was so calamitous for Rommel. Moreover, Malta was a centre where all three Services worked together.

In this great struggle the Army's share was mainly gunnery; but the island was always a base for British submarines, and they and the aircraft struck constantly at the shipping of the Axis. The submarines could play no part in the defence; the aircraft had to operate as defenders and attackers in turn.

Everyone has heard of the three Gladiators named *Faith, Hope and Charity*, flown by flying-boat pilots who had no experience of fighters, but who made themselves a terror to encroaching Italians. The period of the Hurricane I.s was no less remarkable. The odds against which they fought, and fought successfully, make the reader gasp. In twos and threes they tackled the dozens of fighters and bombers which the *Luftwaffe* sent against the island—even though the Me 109 had a greater speed and better performance (though much lighter armament) than the Hurricane I. The few airfields on the island were constantly bombed; and how the fighters carried on reads like a miracle. The eventual arrival of Spitfires in numbers made the defence secure; while Wellingtons and Naval Swordfish went out and smote the enemy.

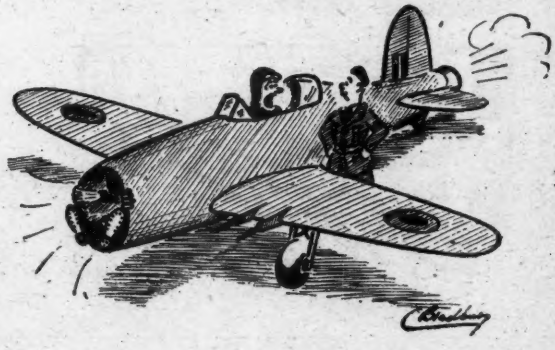
This well-illustrated official publication tells the story in detail, and a shilling seems a very moderate price to pay for such a graphic piece of history.

Front-Line Airline. By E. Bennett-Bremner. Angus and Robertson, Ltd., Sydney and London.

THIS is a story which was well worth telling, though it has not been very well told. It is the story of the work done and the misfortunes suffered by Qantas Empire Airways in the war with Japan. Some of the flying boats of the company were promptly commandeered by the Royal Australian Air Force, and some of them were shot down in action. The remainder continued to do civil work, and this book is concerned with them.

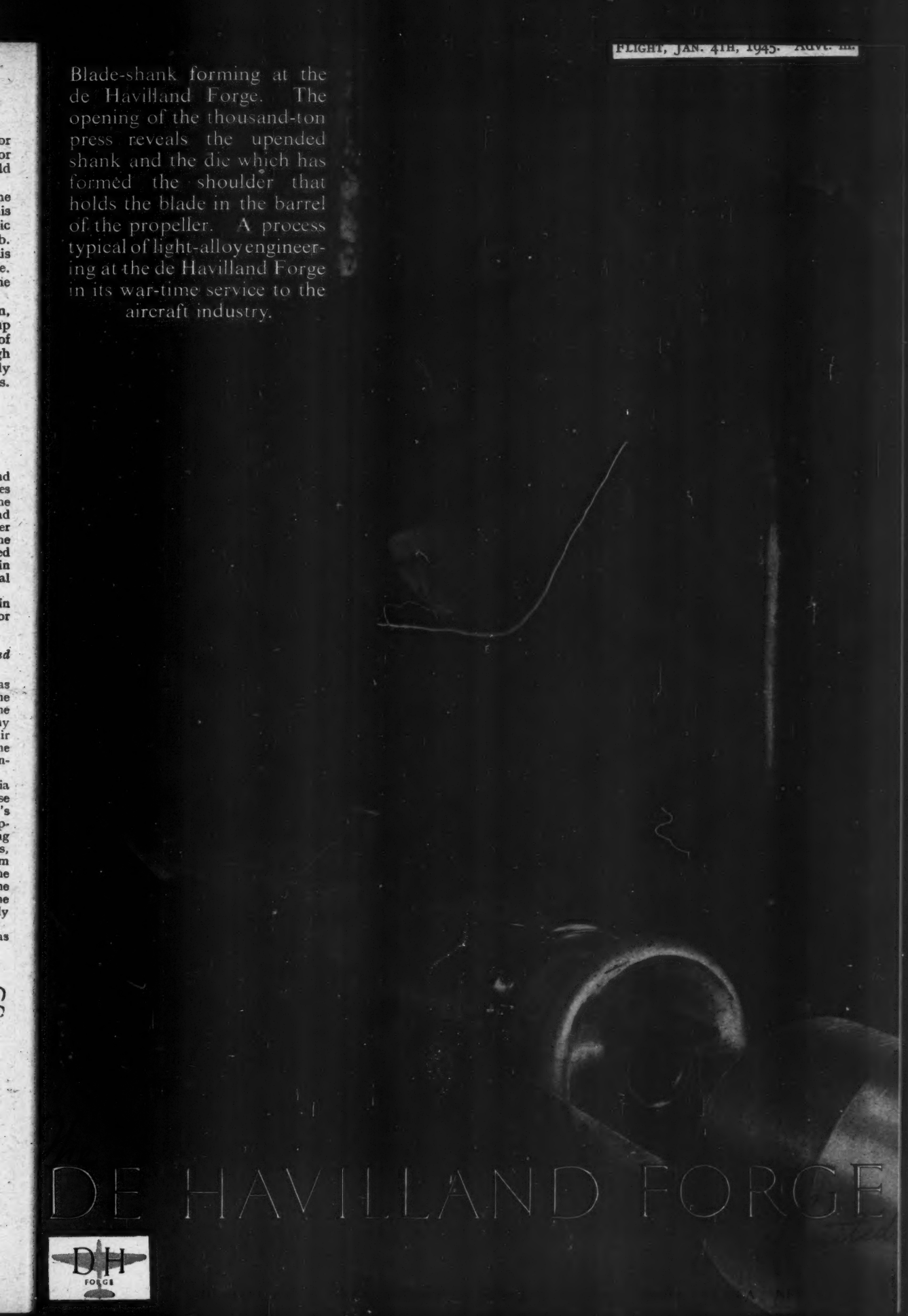
It was not long before the through-route between Australia and Britain had to be abandoned, but during the Japanese invasion of Malaya and the Dutch East Indies the company's flying boats continued to do transport work of many descriptions in connection with the war. Five of their civil flying boats were lost. *Corio* was shot down by Japanese fighters, and probably the same fate befell *Circe*, which vanished from ken when on a flight. *Corinna* was destroyed when the Japanese raided the harbour at Broome. And so on. The courage and determination of the captains and crews of the boats never faltered, and they all repeatedly faced deadly perils in carrying out work of great importance to the war.

This work is still going on, and the complete tale of Qantas Empire's war effort has still to be written.



Somehow or other it does'nt seem to have any power this morning

Blade-shank forming at the de Havilland Forge. The opening of the thousand-ton press reveals the upended shank and the die which has formed the shoulder that holds the blade in the barrel of the propeller. A process typical of light-alloy engineering at the de Havilland Forge in its war-time service to the aircraft industry.



DE HAVILLAND FORGE

DH FORGE

The P.F.F.

Pathfinding, the Highest Standard of Operational Flying in the World

By C. B. BAILEY-WATSON

IT is rather extraordinary that the significance of the letters P.F.F. is not known more widely, even in Bomber Command—the people most affected. In fact, there are all sorts of queer ideas held by the actual bomber crews about the Path Finder Force. The title of "Force" is given to this component of the Royal Air Force because it is representative of Bomber Command as a whole, that is, the Pathfinder crews are recruited from Bomber Command and the P.F.F. serves Bomber Command.

The story behind the Pathfinders is a most interesting one; it is also a story which epitomises the British way of doing things. Taking an ordered survey of events from the outbreak of war brings to light the perilous position which faced this country in those early days between 1939 and 1942. The epic of the Battle of Britain is inclined to overshadow the precariousness of the position which obtained well after the halcyon reign of the Few. And there must be millions of people, literally millions, who lived in a mirage of security engendered by the magnificent victories won over Kentish weald and Sussex down. It was probably as well.

During 1940 we attacked enemy targets with bombs. We also dropped leaflets (and let no one decry the power of this weapon; it is a most important factor). However, to maintain the standard of battle chivalry, the metal bars of the leaflet packs, which normally dropped with the leaflets, were ordered to be wired-up so that they were retained in the aircraft and therefore could not do damage to the enemy, his person nor his possessions.

This is not really relevant to the subject of this article, but it does indicate the way we were carrying-on our side of the war at that period. The bombing raids which were made early on were carried out with ill-equipped, poorly-armed and stolid aircraft by comparison with to-day's standards, but the spirit of the crews was incredibly high; they were absolutely magnificent in their eagerness for the job. However, it is a fact that at the start there was but one Group (equipped with Whitleys) in Bomber Command which was trained for night operation. All the remaining Groups had to be converted by night training, a training in which night navigation played a very large part.

The coveted Eagle/Albatross gilt emblem which distinguishes the qualified Pathfinder.

Early Work

Time went on and the bombing of the enemy was increased, but despite seemingly good bombing reports it was ascertained that the average of hits on the target was, on the whole, very poor indeed. The crews concerned seemed unable to believe this, but photographs proved it and there seemed little that could be done. A planned raid was at that time unknown. Attacks were laid on by individual Groups, and the routes to be taken were governed largely by the particular location of the Group.

The standard of navigation was nothing like it is to-day, the chief area of difficulty being the most important, viz., the last 20 or 30 miles to the target. For some reason the crews seemed to be able to get that far with relative ease, but the last twenty-odd miles more often than not foxed them, so that comparatively few of the raiding aircraft actually attacked the target. At this period the bomber force had not many clues, as the "Boffins" (this is their name for the popularly called "back-room-boys") had not yet started actually delivering much of the incredible equipment which they had devised. Equipment such as the "Gen-box," the story of which startled the world only recently.

During the latter part of 1941 the pursuit of real accuracy can be said to have started, but the efforts were not really co-ordinated, and so the *planned* raids were, at first, rather isolated instances. One of the first of these was on Hüls, about 11 miles W.S.W. of Duisburg, in December, 1941. The next was that famous raid on the Renault works in Paris on the night of March 3rd, 1942, which resulted in the complete stoppage of the factory's production for 3½ months. This, incidentally, was confirmed by a recently captured production report on the Renault output.

Results of Planning

As a result of planning, these raids were conducted from A to Z on a complete schedule, and the dividend returned was a marked increase in bomb strike efficiency. Then came the historic 1,000-bomber raid on Cologne on May 31st, 1942. The total tonnage lifted was no less than 1,700, a phenomenal figure for that time, and of the whole tonnage dropped the percentage which fell on the target gave an increase in bombing efficiency which paralleled the size of the raid.

However, these highly organised raids were still exceptions rather than the rule. Everyone knows that a great part of the country's production was being put into bombers. The Manchester (to be followed almost at once by the Lancaster), the Halifax and Stirling were coming off the production lines, but the U-boat menace was at its height and it could defeat us. It had to be reduced at all costs. The proposal was mooted that a large proportion of Bomber Command should be transferred to Coastal Command. Fortunately this measure proved to be unnecessary.

The reason for the poor showing of our bombing effort was realised: it had no concerted leadership; all the aircraft operating on a raid were independent, and planned forays were not the normal thing.

To provide the required leadership, the Path Finder Force was born on August 15th, 1942. The best squadrons in Bomber Command were combed for their best crews—the absolute cream of the British bombing force—and these men were given the opportunity of volunteering for the P.F.F. A leader for the force was required, and he had to be the right one; the choice was Air Comdre (now Air Vice-Marshal) D. C. T. Bennett, C.B.E., D.S.O., a most obvious choice, for it is said of him that he knows the job of every man under his command better than the man himself, and he has written some of the most authoritative textbooks on navigation. (A short biography of A.V-M. Bennett

appeared in the November 11th, 1943, issue of *Flight*.)

Having formed the P.F. Force, all the gen on bombing was collected and sifted, leaving a foundation of bombing data on which a reliable fabric for operations could be built. The very latest "Boffin" devices were incorporated, and the various firework manufacturers undertook to produce the sort of target-markers required. Preparations being completed, the pathfinders found and marked the German city of Mainz in August, 1942, with the result that the bombing force which followed registered as strikes on the target a higher percentage than ever before.

Improvements in the pathfinding technique and in the application of the scientific aids allowed the main bombing force to attack Cologne on the night of February 2nd, 1943, with an even greater percentage of bombs dropped registered as target strikes. On the 12th night of the following month, March, a raid was laid on for Krupps at Essen. Up till then we had periodically bombed Essen and Krupps with virtually negligible effect and had lost a very large number of aircraft in the process. But on this raid Krupps was to suffer such a blasting that its activity as a productive arsenal for the enemy was crippled for months. No less than 83 per cent. of the bombs lifted registered as direct hits.

Modern Raid Values

To-day, with their operational system at a very high level; with amazing scientific aids that are continually being improved; with all the new embryo Pathfinders benefitting by the mass of experience accumulated, the work done by the main force Groups of Bomber Command has reached a peak of efficiency undreamed of in those struggling years between 1939 and 1943. To-day a target strike of 60 per cent. of the bombs lifted is considered a poor raid; an average raid registers 80 per cent., and only raids with on-target strikes of 90 per cent. and over are considered "good" raids. A truly wonderful achievement.

As may be imagined, the individual technique used by the Pathfinders in marking the targets are many and various. In fact, there are enough operational alternatives to cover any and every type of raid, and, as a consequence, nearly all the bombing attacks made on Germany to-day are planned for mixed types of marking. By this means, any set of conditions obtaining when a raid is laid on can be coped with by P.F.F. as part of their normal procedure.

At the beginning of this article it was mentioned that the men of Bomber Command often have odd ideas about the force that marks their targets for them. For one thing, it is a general misconception that P.F.F. losses are high, whereas in point of fact they are extraordinarily low.

Pathfinder crews wear a small replica of a bird which they castigate as a rather peculiar breed of hawk; actually it is almost identical to the questing Eagle/Albatross of the R.A.F. insignia. It is worn on the flap of the left breast pocket, below the occupational brevet and decorations. The P.F.F. badge is given to qualified crews only, and to qualify a minimum of six successful marking trips is required, plus each crew member passing an exam. set by others in his operational category. The honour of wearing that coveted badge is a great inducement for Bomber Command crews to graduate into the Path Finder Force. The rivalry is very keen, and as the P.F.F. are emphatically insistent upon having only the very best crews, the standard maintained is extraordinarily high. Normally, the P.F.F. badge is a temporary award, and when a man leaves the force his badge is returnable, but if he has done really well whilst a Pathfinder he is usually allowed to keep his badge as a permanent award.

Operational Standard

Crews who are selected for P.F.F. attend the P.F.F. Training Unit, where they have to work very hard to absorb all the gen given them. The complete staff at the P.F.F. T.U. have all individually completed about 60 operational sorties. Their experiences, and the mistakes that have been made in the past, provide a huge fund of the most expert knowledge for impartation to the embryo Pathfinders. As new experience is gathered, and it is accumulating all the time, it is sifted, assessed, and rejected or incorporated. In addition, there is the constant improvement of the scientific devices contributed by the "Boffins," and their evolution of new aids to help the Pathfinders find their target with unvarying precision.

Reliability and Efficiency are the P.F.F. watchwords, and with these go two other cardinal precepts: accuracy and timing. The more one thinks about these the more clearly one understands their value. To-day bombing raids are planned to the very remotest detail. Timing accuracy is set to a standard of 10 seconds, i.e., each aircraft aims to be on target at its zero planned time, and a latitude of 10 seconds is acceptable, not in the sense that its good enough, but in the sense that there are physical limitations beyond which it is almost impossible to go. For example, an aircraft may be flying at 300 m.p.h. to a target 700 miles away, taking a roundabout route, combating various winds of changing direction and speed, but so accurately navigated and flown that it is in its target-marking position within 10 seconds of its planned time. Such accuracy appears impossible; but it can be done—it is done. The veteran Pathfinders who have done it themselves and solved all the multifarious difficulties which faced them in setting so wonderful a standard are ready and willing to give all the aid in their power to the men who aspire to marking the targets of the future.

The Path Finder Force truly sets the highest standard of operational flying in the world.

FRENCH MISSION VISITS FIGHTER COMMAND

THE French Air Minister, Monsieur Tillon, during his recent visit to England, stood on the balcony of the operations room at Fighter Command headquarters where, in 1940, Air Chief Marshal Dowding and his staff directed the R.A.F. Fighter squadrons which fought the Battle of Britain.

M. Tillon, accompanied by General Piollet (Chef du Cabinet Militaire), M. Jugenu (Chef du Cabinet Civil) and Colonel Hartemann (head of Allied Liaison), was welcomed to Fighter Command by the Commander-in-Chief, Air Marshal Sir Roderic Hill. Their visit, said Sir Roderic, symbolised the close sympathy which united Britain and France and the other Allies.

"At this moment," Sir Roderic went on, "the understanding between France and Great Britain is, as Montaigne said, the finest of all harmonies where words and deeds go together. Let us go forward with steady determination—even in victory—never relaxing our vigilance until our enemies are defeated."

M. Tillon inspected a guard of honour of the R.A.F. Regiment and was presented to senior staff officers of the Command. In the operations room the system of plotting enemy raiders and our own aircraft—a system maintained since the outbreak of war—was explained to M. Tillon and the members of his mission. They were given details of the widely varied work now being carried out by Fighter Command—escorting heavy bombers in attacks on Germany, patrols over the battle area, and day and night interception over and around Britain.

Fighter Command's task in the battle against the flying bomb and operations against V.2 sites were also outlined to the mission, whose members were entertained at lunch by Sir Roderic Hill.

POST-WAR R.C.A.F.

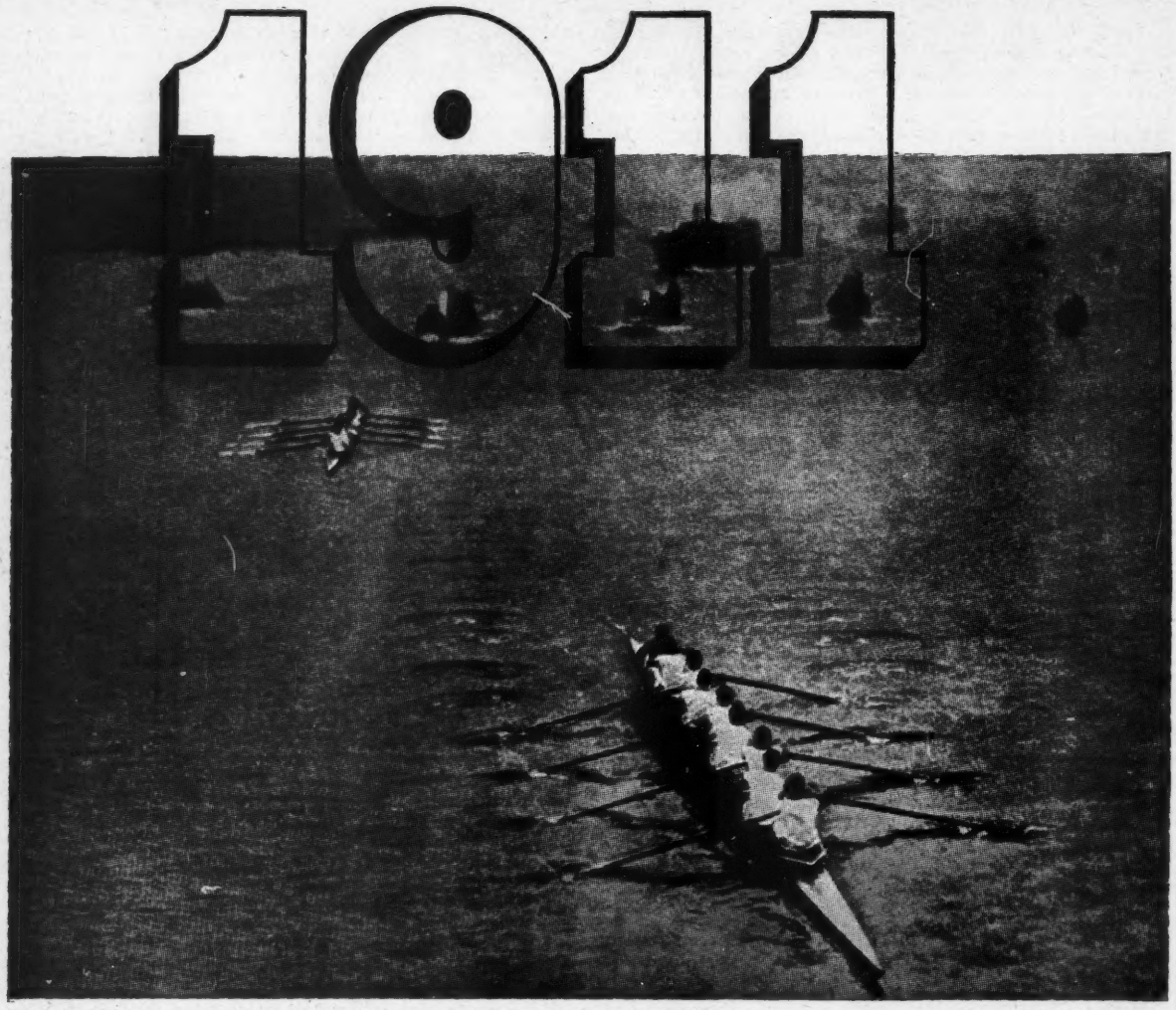
THE extent, character and composition of the post-war R.C.A.F. will not be definitely decided for at least a year, Hon. C. G. Power, Air Minister, announced when disclosing that the British Commonwealth Air Training Plan will terminate on March 31st, 1945.

And this will depend largely on conditions of the peace and Canada's position in post-war world security. The announcement did not indicate what part Canada would play.

"No definite choice of stations to be allotted for post-war use can be made until the size of the post-war R.C.A.F. is decided upon," said Mr. Power.

"And again I repeat the post-war permanent R.C.A.F. will not be definitely formed until after the war and personnel now released and particularly those with overseas experience will not be precluded from making applications to join the post-war permanent R.C.A.F."

Before the war the R.C.A.F. strength was 3,048, and under the British Commonwealth plan grew to 215,173 at its peak.



Oxford wins the University Boat Race by 2¾ lengths in record time (to date) of 18 minutes, 29 seconds. April 18, 1911.

WHEN WE WERE YOUNG

Most photographs of the event show that the spectators were more interested in an aeroplane flying over the course for the first time, than in the race itself. No doubt there were many who deprecated the intrusion of the new-fangled contraption ('if it had been intended that we should fly, we would have wings'), and there could have been few who foresaw the mighty future in the air, that is common understanding now. No public notice was focused on another event of 1911 — the foundation of the firm Cellon, but, amongst other matters, our eyes were fixed on the aeroplane with more than casual interest. The progress of Cellon has been parallel to the progress of aviation and we can look back on thirty odd years of effort with justifiable satisfaction.

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CERRIC CERRUX

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CVS-534

New Year Honours

Many Names Familiar in the Aviation World : R.A.F. Well Represented

BARONET

Sir Charles Bruce-Gardner, lately Controller of Labour, Allocation of Supply, M.A.P.

KNIGHTS BACHELOR

R. H. Dobson, Managing Director, A. V. Roe and Co., Ltd.

W. P. Hildred, Director-General of Civil Aviation.

A. F. Sidgreaves, Managing Director, Rolls-Royce, Ltd.

ORDER OF THE BATH (CIVIL) C.B.

E. Ll. Pickles, Dir. of Contracts, Min. of Aircraft Production.

ORDER OF ST. MICHAEL AND ST. GEORGE—C.M.G.

G. Archer, Under-Sec., Min. Prod.

ORDER OF THE BRITISH EMPIRE—C.B.E.

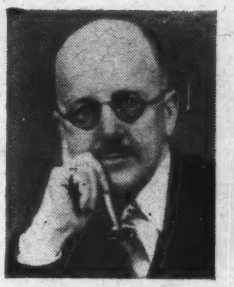
R. H. Coverley, Controller, Rotol Airscrews, Ltd.; **Wing Cdr. A. H. Measures,** R.A.F. (Retd.), Manager, Associated Airways Joint Committee; **F. Williams,** Controller, Press Censorship and News, M.O.I.; **Sen. Cdr. P. A. Wills,** A.T.A.

ROYAL AIR FORCE

ORDER OF THE BATH

K.C.B. (MILITARY DIVISION)

Air Marshal Sir Keith Rodney Park, R.A.F.; **Air Marshal Sir Harold Edward Whittingham,** K.H.P., R.A.F.; **Air Vice-Marshal George Laing,** R.A.F.



Mr. A. F. Sidgreaves —a Knighthood.

C.B. (MILITARY DIVISION)

A.V-M. L. O. Brown, R.A.F.; A.V-M. T. W. Elmhirst, R.A.F.; A.V-M. A. Grant, R.A.F.; A.V-M. T. A. Langford-Sainsbury, R.A.F.; A.V-M. E. B. Addison, R.A.F.; A.V-M. E. D. Davis, R.A.F.; A.V-M. B. E. Embry, R.A.F.; A.V-M. F. L. Hopps, R.A.F.; A.V-M. E. C. Hudleston, R.A.F.; A.V-M. C. E. W. Lockyer, R.A.F.; A.V-M. C. M. McEwen, R.C.A.F.; A.V-M. F. H. McNamara, V.C., R.A.A.F.; A.V-M. S. F. Vincent, R.A.F.; A.V-M. J. Whitford, R.A.F.; Air Comdre. C. E. H. Allen, R.A.F.; Air Comdre. G. H. Boyce, R.A.F.; Air Comdre. P. R. T. J. M. I. C. Chamberlayne, R.A.F.; Air Comdre. L. H. Cockey, R.A.F.; Air Comdre. P. E. Maitland, R.A.F.; Air Comdre. S. O. Bufton, R.A.F.; Air Comdre. P. L. Lincoln, A.A.F.; Air Comdre. I. T. Lloyd, R.A.F.

CANADIAN LIST

ORDER OF THE BATH—C.B. (MILITARY DIVISION)

A.V-M. J. L. E. A. de Niverville; A.V-M. A. Ferrier; A.V-M. K. G. Nairn, R.C.A.F.

ORDER OF THE BRITISH EMPIRE—C.B.E. (MILITARY DIVISION)

A.V-M. A. Raymond; Air Comdres. H. L. Campbell; A. L. James; E. E. Middleton; D. McC. Smith; G. E. Wait, R.C.A.F.

O.B.E.

Grp. Capts. C. J. Collingwood, R.A.F.; D. A. Harding, R.C.A.F.; M. M. Hendrick, R.C.A.F.; J. G. Ireland, R.C.A.F.; B. McPherson, R.C.A.F.; G. G. Morrow, R.C.A.F.; C. F. G. Rogers, R.A.F.; C. L. Trecarten, R.C.A.F.

BAR TO AIR FORCE CROSS

Sqn. Ldr. J. Hone, R.C.A.F.

AIR FORCE CROSS

Grp. Capts. W. E. Kennedy, R.C.A.F.; A. Lewis, R.C.A.F.; F. J. Mawdesley, R.C.A.F.; P. H. Maxwell, R.A.F.; Wing Cdrs. N. S. A. Anderson, R.C.A.F.; M. A. W. Davidson, R.C.A.F.; G. G. Diamond, R.C.A.F.; N. L. Drynan, R.C.A.F.; G. O. Godson, R.C.A.F.; D. R. Jacox, R.C.A.F.; M. C. Staddon, R.C.A.F.; W. T. F. Wightman, R.A.F.; Sqn. Ldrs. E. A. Alexander, R.C.A.F.; G. G. N. Barrett, R.A.F.; J. F. Barrett, R.C.A.F.; W. W. Gilmour, R.C.A.F.; M. C. McDiarmid, R.C.A.F.; E. H. Moles, R.C.A.F.; G. H. Newsome, R.C.A.F.; O. A. H. Sims, R.C.A.F.; R. C. Stovel, R.C.A.F.; K. G. Taylor, R.A.F.; V. W. Thompson, R.C.A.F. Flt. Lts. H. F. Darragh, R.C.A.F.; P. Gibbon, R.C.A.F.; W. H. L. Godsalve, R.A.F.V.R.; J. R. Graham, R.C.A.F.; W. R. Lavery, R.C.A.F.; J. A. Lewis, R.C.A.F.; W. R. McAllister, R.C.A.F.; D. H. McLaren, R.C.A.F.; K. R. Stoker, R.A.F.V.R.; F/Os. E. S. English, R.C.A.F.; G. W. Harrison, R.A.F.V.R.; K. H. Rub, R.A.A.F.; E. McG. McQ. Steel, R.C.A.F.

Sir Charles Bruce-Gardner former chairman of the S.B.A.C.—a Baronetcy.

AUSTRALIAN LIST

ORDER OF THE BATH C.B. (MILITARY DIVISION)

A.V-M. T. E. V. Hurley, R.A.A.F., Dir. Gen. of Med. Serv.

ORDER OF THE BRITISH EMPIRE—C.B.E. (MILITARY DIVISION)

Air Comdre. R. J. Brownell, R.A.A.F.; Brig. J. E. Down, A.I.F., Dir. of Dental Serv.

O.B.E.

Grp. Capt. H. A. Austin, R.A.A.F.; Maj. P. L. Bazeley, A.M.F., 2/8 A. Armd. Regt.; Chaplain W. H. Henderson, R.A.N.; Lt. Col. J. E. Marsh, A.I.F.; Grp. Capt. H. B. Seekamp, R.A.A.F.; Lt. Col. C. L. Southwell, A.I.F.

Air Chief Marshal Sir Christopher Courtney —G.B.E.

ROYAL RED CROSS

ROYAL RED CROSS (FIRST CLASS)

Lt. Col. E. D. K. Butler, A.I.F.; Prin. Matron M. K. Doherty, R.A.A.F.; Lt. Col. S. A. J. Haines, A.I.F.; Maj. M. J. Hanna, A.I.F.; Lt. Col. E. V. Kenny, A.I.F.

ROYAL RED CROSS (SECOND CLASS)

Maj. E. J. Bowe, A.I.F.; Cpl. R. B. Gabriel, A.I.F.; Capt. M. M. Glasgow, A.I.F.; Lt. M. M. Gunton, A.I.F.; Capt. L W. Tippett, A.I.F.; Sen. Sister E. E. Ward, R.A.A.F.

AIR FORCE CROSS R.A.A.F.

Sqn. Ldr. P. J. Gibbes, Sqn. Ldr. R. W. H. Harrison, Sqn. Ldr. E. J. Jones; F/O. J. K. Madden, Sqn. Ldr. D. L. Pank; Wing Cdr. C. H. C. Thompson; Sqn. Ldr. J. A. Wawn.

AIR FORCE MEDAL

Sgt. T. W. Tucker, R.A.A.F.

SOUTH AFRICAN LIST

C.B.E.

Brig. C. G. Ross, S.A.A.F.

AIR FORCE CROSS

Capt. J. T. Slabbert; Capt. T. W. P. J. Baard; Capt. C. P. Mouton; Capt. F. L. C. Rosslee; Lt. A. G. Randall; Lt. W. W. Steyn, S.A.A.F.

NEW ZEALAND LIST

ORDER OF THE BRITISH EMPIRE C.B.E. (MILITARY DIVISION)

Grp. Capt. K. L. Caldwell, R.N.Z.A.F.

O.B.E.

Sqn. Ldr. H. T. Grigg, R.N.Z.A.F.

AIR FORCE CROSS

Flt. Lt. W. G. W. Burgess; Sqn. Ldr. D. A. Greig; Wing Cdr. R. G. Linklater; Sqn. Ldr. R. J. R. Makgill, R.N.Z.A.F.; Flt. Lt. H. A. Nash, R.A.F., seconded to R.N.Z.A.F.; Sqn. Ldr. T. D. Webster, R.N.Z.A.F.

AIR FORCE MEDAL

Sgt. F. W. Mayer, R.N.Z.A.F.

DOMINIONS OFFICE LIST

ORDER OF THE BRITISH EMPIRE—C.B.E. (MILITARY DIVISION)

Wing Cdr. G. Ellmann-Brown, S. Rhodesian Air Force.

ORDER OF THE BRITISH EMPIRE.

ROYAL AIR FORCE

G.B.E. (MILITARY DIVISION)

Air Chief Marshal Sir Christopher Lloyd Courtney, R.A.F..

K.B.E. (MILITARY DIV.)

Air Marshal James Milne Robb, R.A.F.; A.V-M. The Hon. Ralph Alexander Cochrane, R.A.F.; A.V-M Lawrence Arthur Pattinson, R.A.F. (Retd.).

(Continued Next Week)

Chicago Summary

A Review of Agreements : Set-up of International Bodies : Technical Co-operation

WITH the long deliberations of the Chicago Conference concluded, it is now possible to present a summary review of its efforts and achievements. So long as the conference was in session, not only would it have required the agility and suppleness of a sporting-news broadcaster to comment upon its aerobatic vicissitudes, but a cohesive picture was hardly possible.

Now that the book is closed one can ask what is really in it. The distance in time is sufficient to give the minimum perspective necessary for an objective evaluation of the results of the conference, allowing one to sort the important from the trivial, to see the positive sides as well as the obvious gaps in international air collaboration which it revealed. Fortunately, these results somewhat alleviate the initial picture.

For five long weeks the delegates of 52 nations were locked in a tourney to shape post-war aviation. And if those weeks revealed an inclination on the part of the major contestants to form their own code of rules and a basic inclination to agree to differ, the fact must not be overlooked that this was the first time that they met in the open.

Without going into the details of the fundamental differences between the views held by the different participants, this conference nevertheless achieved a number of modest agreements far-reaching in their scope.

Four principal agreements were reached: (1) *The Interim Agreement on International Civil Aviation*; (2) *The Convention on International Civil Aviation*; (3) *The International Air Services Transit Agreement; and* (4) *The International Air Transport Agreement.*

The first document, signed by 34 nations (including the U.K.) sets up a Provisional International Civil Aviation Organisation of a technical and advisory nature of signatory sovereign states to last until a permanent organisation is created but not longer than three years.

This organisation, which will have its seat in Canada, will meet annually and will be composed of an Assembly based on equal representation and voting of all member states, and of a Council. The latter is to consist of not more than 21 member states, elected by the Assembly for a period of two years. In electing Council members, the Assembly shall give "adequate representation" to members, of chief importance in air transport, and to those not otherwise included who contribute the largest provision of air navigation facilities, thus ensuring representation of all major geographical areas of the world.

The International Council

In addition to the usual powers and duties (such as the election of a non-voting president, officers, employees, etc.), the Council will establish at least five subsidiary working groups, including a committee on air transport, a committee on air navigation, and a committee on international convention on civil aviation. These groups will work under the supervision of the Council studying and reporting on their respective fields. The Council will not only act as a clearing house for such information; it will recommend for

U.K. Delegation : (Left to right) G. G. Fitzmaurice, W. C. G. Cribbett, Sir Arthur Street, Lord Swinton (chairman), Sir George London, J. H. Magowan, C. A. J. Walsh.

adoption and secure application of these measures, analyse all information regarding subsidies, costs of operation, and tariffs. It will hold open to inspection by member states all existing contracts, agreements, etc., relating to routes, service, etc.

To this end all member states undertake to transmit to the Council copies of all existing and future contracts to which any member or any airline of a member state is a party, as well as statistics including those showing all receipts and their sources.

The chairman: Adolf A. Berle, Jnr., U.S.A.

Finally provision is made for the Council to act as an arbitral body and to study all matters upon which no agreement has been reached.

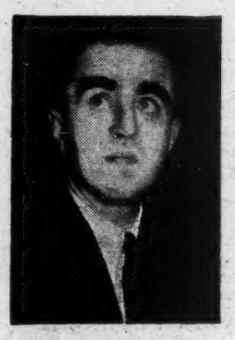
The Convention on International Civil Aviation, signed by 32 nations, sets up a Permanent International Civil Aviation Organisation. The pattern of this organisation, upon which the interim body is modelled, comprises an Assembly in which all members are equally represented, each having one vote (a majority constituting a quorum) and a Council composed of 21 states elected by the Assembly for three years.

Subject to approval by any general international organisation set up by the nations of the world to preserve peace, other states may be admitted to participation in the Convention by means of a four-fifths vote of the Assembly and on such conditions as the Assembly may prescribe; provided that in each case the assent of any state invaded or attacked during the present war by the state seeking admission shall be necessary.

Andre Carnault, of the French Air Ministry.

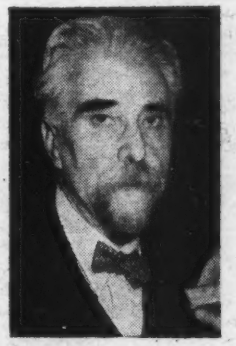
The 96 articles of this document establish the privileges and restrictions of all contracting states on a non-discriminating basis; set up codes of operations for aircraft and personnel; provide health and safety rules for aviation; recommend duty, customs and immigration methods and navigation facilities for member states, and arrange for a twelve-member Air Navigation Commission of technical experts.

Pursuant to the recognition of the principle that every state has complete and exclusive sovereignty over the air space above its territory (including territorial waters), it is agreed that no scheduled international air service may be operated over or into the territory of a contracting state without previous authorisation. The right of cabotage is dependent upon such permission, but each state undertakes not to grant or obtain exclusive cabotage rights.



M. P. L. Steenberghe, Netherlands, chairman Technical Committee.

An interesting feature is the prohibition of pilotless aircraft flight over a state territory without special authorisation by that state in which event "every contracting state undertakes to ensure that the flight .... in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft."



Belgium: Emile Allard, Technical Adviser.

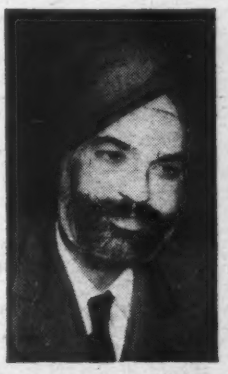
Of more immediate interest are the provisions of adequate air navigation facilities and standard systems.

These will be the task of a twelve-member Air Navigation Commission of technical experts appointed by the Council. The contracting States bind themselves not only to collaborate in international measures and to secure publication of charts, etc., but (a) to provide in their respective territories airports and other facilities for international air navigation in accordance with the standards and practice recommended; and (b) to adopt and put into operation in such organisations appropriate standard systems of communication procedure—codes, markings, lighting, etc.—which may be internationally recommended or established.

Chinese Leader: Kai-Ngau Chang, vice-chairman, Interim Council Committee.

The adoption of such recommended standard systems requires a vote of two-thirds of the Council.

An entirely novel feature is here introduced with the power of the Council (in agreement with the State concerned) to finance, provide, maintain and administer any air navigation facilities (including construction of airports) where such facilities are not adequate, although, naturally, the Council has no right to impose its wishes upon any sovereign State. This provision is interesting in its implication, as it is likely to be of considerable value in the practical application of international collaboration.



A delegate from India: Sirdar Gurudayal Singh.

From this go-ahead level we step down to the rather tricky issue of acceptance of internationally formulated standards. The undertaking of the signatories—as pointed out above under (b)—is followed by a major loophole in a further article, which says that if any State finds it impracticable to comply in all or any respects with such international standards, it must notify the Council, which in turn will pass the notification on to other members. There is, therefore, no remedy or power to enforce a generally accepted standard except Article 39 (which, admittedly, may be a strong deterrent), which provides for endorsements of any certificates or licences which vary from international standards, and the exclusion of aircraft or personnel so endorsed from international air navigation.

Transit Rights

Finally, we come to the two agreements which have obviously caused most of the friction at Chicago. The International Air Services Transit Agreement, presented in the form of a separate appendix, provides for the mutual exchange of "two freedoms of the air" among those nations which choose to sign it. The two freedoms are the right to fly across foreign territory without landing, and the right to lend for non-commercial purposes. These rights are, of course, granted subject to certain conditions, each contracting State reserving the right to withhold them from an air transport enterprise of which it is not satisfied that substantial ownership and effective control are vested

CHICAGO SUMMARY

in nationals of a contracting State. Here one detects clearly a lesson from Germany's pre-war infiltration into South America and an attempt at prevention of similar guises.

This agreement was signed by 26 nations: Afghanistan; Ecuador; France; Egypt; Greece; Haiti; Honduras; India; Iraq; Lebanon; Mexico; Netherlands; New Zealand; Nicaragua; Peru; Philippine Commonwealth; Poland; Spain; Sweden; Turkey; U.S.A.; Uruguay; Venezuela; and the Ministers from Denmark and Thailand. Lord Swinton signed for the U.K., with the reservation that "failing later notification of the inclusion . . . this agreement does not cover Newfoundland," and the Swiss delegate had no power to sign.

Lastly, the International Air Transport Agreement, which found the smallest number of adherents. This provides for the mutual exchange between the signatories of the "five freedoms." They are an extension of the first two in the preceding agreement by a further three, namely, the right to disembark in a foreign country traffic originating in the State of origin of the aircraft; the right to pick up in a foreign country traffic destined for the State of origin of the aircraft, and the privilege of carrying traffic between territories of any other member State. The last three extended "freedoms" relate to through-services on a route constituting a "reasonably direct line out from and back to the country of the aircraft's origin." A further limitation of the fifth freedom, if somewhat ambiguous, is the undertaking of the signatories not to interfere unduly with the regional services in their efforts to establish and operate such through-services. In fact, the fifth freedom is made entirely tentative; it could be excluded by any signatory or cancelled at six months' notice. Of this reservation, the delegate for Turkey availed himself; the Philippine Commonwealth indicated that it might sign later, and the Swiss representative stated his lack of authority to sign.

A Persian delegate: M. Taghi Nassr.

Sweden: Tord Knutsson Angstrom.

Turkey: Sukru Kocak, Turkish Air League chairman.

Ethiopia and Egypt: Blattae Tewekde (left), C. Osman Hamdy.

Of the 16 nations that did sign this 5-Freedom Agreement in addition to the U.S.A., nine were American States, viz., the Dominican Republic; Ecuador; Haiti; Honduras; Mexico; Nicaragua; Peru; Uruguay; and Venezuela. Of European nations only Sweden, Turkey and the Minister for Denmark signed the document.

This is thus the scope of the agreements reached at Chicago. Although one cannot help regretting that they present a loose form of organisation, their lack of authority reminding one of the pre-war effort of international collaboration, some measure of mutual co-operation has been established, and at least some limitations have been set to the misuse of aviation.

In the field of technical matters the Chicago conference produced a wide programme for future co-operation and for the introduction of uniform standards. With continued goodwill and accumulated experience, possibly the International Organisation will be on equally wide foundations and endowed with real authority in other vital matters.

CIVIL AVIATION NEWS

JO'BURG AIRPORT

THE South African Government is building a huge airport at Johannesburg at a cost of £4,000,000 and two smaller ones at Durban and Cape Town. These will have surfaces and services to cope with 150-ton aircraft.

VENEZUELAN AIR PLANS

THE Venezuelan Government is planning post-war improvements to forty landing fields and the construction of nineteen major airports, states a report of the U.S. Department of Commerce.

COMMONWEALTH AIR TALKS

FOLLOWING the Chicago Conference on Civil Aviation and the Montreal conversations, a number of Commonwealth representatives in London have continued their discussions in London, under Lord Swinton's chairmanship.

Australia was represented by Mr. A. S. Drakeford, and by the High Commissioner; New Zealand by Mr. D. G. Sullivan; Canada and South Africa by representatives of the High Commissioners; Southern Rhodesia by Wing Cdr. Davison; the United Kingdom by representatives of the Air Ministry, Ministry of Aircraft Production, Department of Civil Aviation, Dominions Office, India Office and Colonial Office. Lord Knollys, Chairman of B.O.A.C., was also present.

The Indian representatives were unable to reach England from America in time, but will join in on arrival.

MANCHESTER SCHEMES

THE Manchester City Council Airport Committee are considering a number of alternative schemes for the extension of Ringway Airport. Details of these schemes under discussion by the Airport Committee have not yet been submitted to the City Council for their consideration.

U.S. HOME AIRMAIL

LATEST statistical reports of the U.S. Post Office Department of Internal Airmail Routes and Services show that as of January, 1944, services performed amounted to a total mileage of 8,550,143 and 7,044,897,284 pound-miles.

FROM LATIN AMERICA

MEXICO will shortly possess two new airports—at Nuevo Laredo, Texas, and at Mexico City. The latter site will actually be an extension of the already established Central Airport. This is to have six major runways varying between 5,500 feet and 8,000 feet. Additional airport facilities and offices are to be provided to cope with an estimated 2,000 people at any one time.

The Argentine Government is to build a larger and more modern airport at Esteban to the south side of Buenos Aires. The area required for its development will be approximately 6,000 hectares.

CIVIL AVIATION NEWS

CLIPPERS COME-BACK

PAN AMERICAN WORLD AIRWAYS returned to commercial operations on January 1st.

A statement issued by the company said that while the American Government will retain the control of priorities, Pan American Boeing Clippers will resume the regular flights to Europe and Africa.

AIRSPEED FEEDER LINER

MR. ALAN S. BUTLER, chairman of Airspeed, Ltd., disclosed that his firm is planning the construction of a new civil air liner capable of accommodating up to 40 passengers.

The firm's development section is now at work on the prototype of the aircraft, which is designed specially for feeder line operation for European and other routes.

"This size of aircraft," Mr. Butler said, "represents, in our opinion, one of the most important categories in air transportation in the next ten years."

ENGLAND-AUSTRALIA

A DAILY mail service which will complete the journey between Australia and Great Britain in approximately 60 hours is expected to be in operation soon, the Australian Air Minister announced in a recent Press conference in London. The B.O.A.C. will operate as far as Karachi, where the Quantas Airways will take over.

Explaining why Australia has recently placed in America aircraft orders worth £2,000,000, he said that operators in Australia were urgently in need of aircraft suitable for reinforcing their lines, a very high percentage of which are running to capacity. The Australian Government gave permission to place these orders in America knowing that orders placed in the United Kingdom could not be fulfilled for a number of years.

It does not mean that Australia wishes to buy American aircraft in preference to any others, but to place orders with the people who can fulfil them at the earliest possible date, Mr. Drakeford added.

Yes he's here, he's just got back from that Chicago Conference.

CANADIAN RESULTS

THE traffic report released from the headquarters of the Canadian Pacific Lines shows 8,336 passengers carried during the month of October, an increase of 35 per cent. over the corresponding month in 1943. The 99,349 pounds of mail transported represented a decrease of 30 per cent. Goods carried amounted to 924,667 pounds, an increase of 6 per cent. from the previous year.

The report also shows that for the ten months ended October 31 there were 93,685 passengers carried, an increase of 52 per cent., and 25,681,589 passenger miles flown, an increase of 26 per cent. over the same period in 1943. Mail pounds totalled 1,184,050, a decrease of 37 per cent., and goods 7,455,954 pounds, a decrease of 14 per cent.

STEAMSHIP COMPANIES RECOMMENDED

AFTER making an investigation on the subject of the Merchant Marine in overseas aviation, the U.S. Committee on the Merchant Marine and Fisheries recommended to Congress that it would "be in the public interest to permit American Steamship lines to employ air services in their operations."

Steamship companies that have filed applications with the Civil Aeronautics Board to operate transoceanic airlines in connection with the operation of their surface ships, are: Atlantic, Gulf and West Indies, Incorporated; American President Lines, Ltd.; Grace Lines, Incorporated; Matson Navigating Company; Moore-McCormack Lines, Incorporated; Seas Shipping Company; United Fruit Company and Waterman Steamship Corporation.

The committee, in its conclusion to the report unanimously expressed their opinion that American-flag steamship companies should be permitted to operate aircraft over their established trade routes, with such extensions and deviations as may be necessary or advisable to insure safe and economic service, and the fullest development of old and new trades areas.

MORE BILATERAL AGREEMENTS

AGREEMENTS providing for commercial air transport services between the U.S. and Denmark and Sweden were concluded by an exchange of notes. The agreements incorporate the standard clauses adopted at Chicago for use in bilateral agreements relating to scheduled air services.

The agreement with Sweden refers to an arrangement signed September 8th and 9th, 1933, in which the two countries consent to operation of air transport over both countries. To that arrangement the new agreement adds ten articles ruling on airworthiness of aircraft, use of air force, fuel and other technical matters.

An annexe to the agreement states that U.S. airlines obtain the rights of transit and non-traffic stops in Swedish territory, as well as the right to pick up and discharge international traffic in passengers, cargo and mail at Stockholm, on the following routes: New York or Chicago, via intermediate points, to Stockholm, in both directions.

Swedish airlines obtain the same rights on the route Stockholm (via intermediate points) to New York or Chicago, in both directions.

The agreement with Denmark is similar to that with Sweden and grants rights to U.S. airlines in Denmark and Greenland. It contains the additional clause that it will "enter into force provisionally on January 1st, 1945, and definitely upon confirmation by a free Danish Government when such Government shall have been established following the liberation of Denmark."

NEW ZEALAND FIGURES

ACCORDING to the most recent (July, 1944) monthly abstract of statistics for New Zealand, received in this country, there was an increase of 70.3 per cent. (or a total of 12,472) in the number of passengers carried on internal civil air services for the March, 1944, quarter, as compared with the same period of 1943.

In the 12 months period ending March, 1944, 855,110 miles were flown on internal services as compared with 705,972 for 1943; and freight figures are 191,114 lb. against 174,757 lb.; mail 244,614 against 220,527 lb.; mail-ton miles 29,678 against 23,887; and hours flown 6,643 against 5,763.

BORDER-LINE AIRPORT

PLANS for a "dream airport" to serve Windsor's (Ontario, Canada) population of 115,000 and Detroit's 2,000,000 after the war are under consideration by influential business men on both sides of the border. The proposed airport, cost of which is estimated at $8,000,000, would be near the Canadian end of the Ambassador Bridge It would be four miles square, sufficiently big for the largest post-war transport aircraft.

Aviation committees of both cities are studying the scheme.

The proposal envisages the taking over by the Dominion Government of a tract of land adequate in size for all present and future airport requirements, and for use as an international base for the air traffic of the world. Within the tract would be built the airport with 10,000ft. long runways, hangars and other servicing equipment, terminal buildings housing custom and immigration officials of both countries, an international post office; stores and concessons of other kinds, and warehouses, storage space, passport and clearance offices of other nations.

A "sealed road" leading from the field to Detroit would eliminate Canadian customs difficulties for United States passengers and freight.

NEW SWISS AIRPORT

THE Swiss Government has approved a plan of the Defence Department for the construction of an extensive airfield in Rotenturm (Canton Schwyz), said the Swiss Radio. The airfield is designed to develop international civil aviation.

"Indicator" Discusses Topics of the Day

About Amphibians

Pros and Cons of a Once Much Discussed Type: Can the Idea be Practical as Well as Pretty? : A Word About Sea-going Aircraft in General

ON paper, at least, the amphibian type of aircraft has always appeared as an attractive proposition both for the wealthier kind of private owner and for certain airline operators. Thinking of it in more or less general terms, it is difficult not to wish the type to be a little more mechanically practicable when possibilities are so very pleasant. Furthermore, the layout gives the designer and prospective owner some very fine opportunities for exercising their native ingenuity.

Unfortunately, any applied ingenuity in the design of an amphibian is not only likely to cost a good many pounds sterling, but to weigh a fair number of pounds avoirdupois. It is an unhappy fact that nearly all multi-purpose devices of any kind tend to be inefficient when applied to each of their severally designed purposes. However ingeniously and expensively the manufacturer goes about the business of producing an amphibian, it seems that it must necessarily be a clever compromise and even comparatively inefficient as a flying machine.

Which is not to say that a well-designed amphibian will never be used. There must be a number of prospective air-routes in the world on which such a type would be the only possible solution. I won't enlarge on the geographical and economic situations in undeveloped countries which would make such a service worthwhile. There may still be a sufficiently large number of comparatively wealthy prospective owners who would be ready to pay fairly high initial and running costs for the pleasure and privilege of operating such an amusing type of craft.

But there should be no illusions about the problems involved. Designers will certainly have no illusions. They know that, if it is to be usefully seaworthy, an amphibian must be fairly large; and, whether it is to be flown from land every day or only twice in its life, the undercarriage must be strong enough to take any reasonable landing loads on any kind of surface. Since this undercarriage will, almost inevitably, be of somewhat narrow track, it may even be heavier than the average, and the retracting gear (whether hydraulic, electric, or chain-and-sprocket-cum-elbow-grease) will weigh quite a number of pounds. All of which means that, in order to carry around passengers and luggage, a deal more power than that required by the conventional landplane will be necessary—with a bit more added to cover the inherent glueyness of water and the unstickableness of hull-steps.

Getting over the "Hump"

There is the blackest nigger in the woodpile. In any but good conditions of wind, wave and tide, a very real reserve of power is necessary to make a sea-going aircraft fly before it breaks either its own back or the heart of the pilot. Any pilot who can clearly remember his first perspiring efforts to get a medium-sized flying boat into the air from a difficult sea will shy at the idea of owning an under-powered, small-scale boat, except for amusement only and on an inland stretch of water. Bigger sea-going aircraft seem to be fairly well-behaved once their technique has been mastered, but a miniature affair with a high thrust-line and small-scale hull seems to be a law unto itself, even in fairly good water conditions.

No ordinary rules of control reaction seem to apply during the take-off, and the entire structure will have to be fairly strong if it is to suffer undamaged the buffetings received. At the start of the run it is either digging in a float or trying to emulate a submarine, and even when it is "on the step" the pilot's troubles are not quite over. Power, as I've said, is usually the only thing to save the day. Even with larger boats "override" power may have to be held for uncomfortably long periods in poor engine-cooling conditions. While a landplane will be off the ground (and power may consequently be reduced), after a certain definite number of seconds in any conditions, nothing quite so reliable can be expected in the behaviour of a sea-going aircraft. But, remembering the tremendous performances put up by our own Sunderlands in emergency conditions when grossly overloaded, maybe I'm speaking out of turn when considering the larger sizes.

However ingeniously designed, an amphibian must, too, be somewhat top-heavy when it is away from its primary element. So that the airscrews and engines shall not be damaged, these, with the lifting surfaces, must be high up, and the undercarriage must be tall enough to prevent any possibility of damage to the hull during a heavy landing on bad ground. And, without adding further weight and complication, it is difficult to see how the undercarriage can be anything but narrow in relation to the span. So we have a high, narrow-track affair which is likely to be something of a handful in cross-wind or gusty conditions.

The Question of Weight

Of course, the amphibians we have so far seen are by no means the last word, and our designers may still see their way round many of the inherent difficulties. But weight and the necessary extra power will always give them cause for suffering unless they have a free hand in designing something for special duties—any attendant disadvantages being clearly understood and tolerated by all.

In spite of all the difficulties and disadvantages, we can still give the more expertly contrived amphibian at least three prospective civil markets: Among airline operators who wish to fill a very special need in difficult mixed terrain, where only an amphibian is practical, or where, also, prestige demands the operation of a service; among the wealthier private owners whose passions happen to be both for sea-going and air-going aircraft; and among the joy-ride firms who wish to give their customers a new kind of experience, choosing, of course, the right moments and the best weather for such excursions as may be demanded.

A few enthusiasts will be happy to play about with small flying boats rather as they might amuse themselves with a sailing dinghy, but they are not likely to bother with the complications attendant on amphibiousness, and will learn to be neither surprised nor indignant if, on occasion, their economically under-powered boats fail to do much more than porpoise.

It remains to be seen whether the pure unencumbered flying boat has had its best day for the time being—though that day was not, I feel, fully exploited. In the years before the war, when airfields were few, bad, and far between, it was thoroughly economical and sensible to make use of the available water "landing" areas which required little or no development work before use. Our own Empire air routes were (and possibly still are) particularly suited to flying-boat operation, so it was not really surprising that Imperial Airways and its American counterpart, Pan American Airways, should have made such good and successful use of this type of aircraft.

But it has not been all so easy even for these two big and experienced airline operators. Water is rarely flat; aircraft hulls and wing-floats are easily damaged; landing places are still limited, so that the captain hasn't quite

ABOUT AMPHIBIANS

a perfect choice of alternative terminals in bad weather; and, most important of all, a marine aircraft probably requires more skill and experience than a landplane for its safe pilotage.

The operation of flying-boats was and is a psychologically good thing where passengers are concerned. For some reason which I appreciate but cannot explain, a passenger feels more at home in an aircraft which operates from water and which will normally be flying over or near water in the course of its travels. Perhaps it is the commonly-held belief that water is less hard as a tumbling medium than land, and a boat hull is very solid in appearance and can be made very comfortable. We are, too, as a nation, boat-minded.

Maybe the really immense flying-boat has a big future on the world's airlines. In this still somewhat rule-of-thumb and trial-and-error world of aerodynamics I would be quite prepared to find that, when we reach the hundred-ton sizes, some very special advantages will be found. Perhaps the structure weight will, all in all, be lower; the large hull may be altogether more seaworthy and the shape conducive to drag-less progress; perhaps even it will be found that undercarriages and tyres for these giants will be such a troublesome, expensive and weighty problem that it will be more sensible to try to do without these items.

Knowing how the designers even now grope darkly in the brave new world of great weights and very high speeds, anything is possible. I, for one, would like to see the boat come into its own.

"INDICATOR."

From Fighter to Amphibian

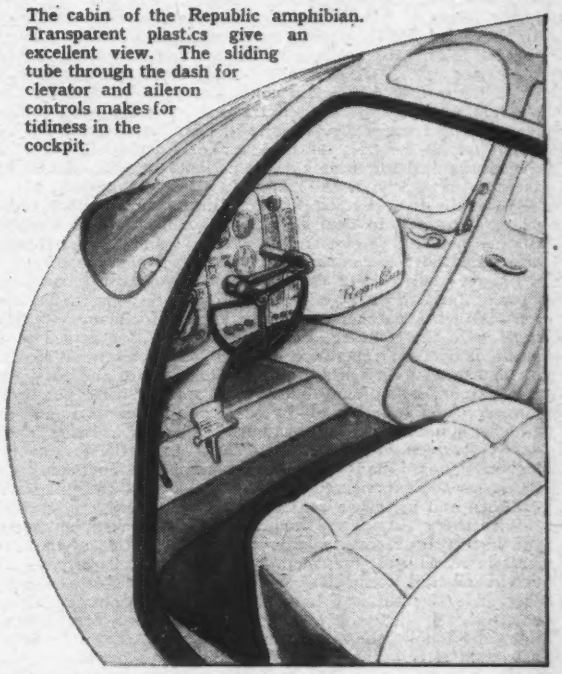
Republic Aviation Corporation's Post-war Four-seater

ENGINEERS of the Republic Aviation Corporation have found time from their work on military aircraft to get out a project for a small four-seater amphibian for the post-war years. Their solution is interesting in view of what "Indicator" has to say about amphibians in his "Topics" on this and the previous page.

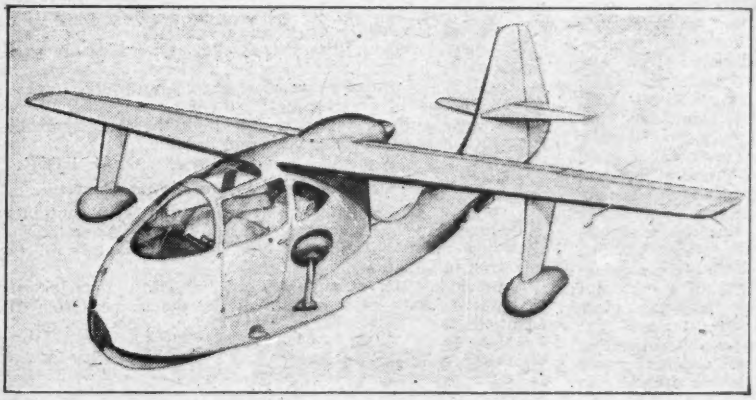
The machine is fairly orthodox so far as general layout is concerned, the pusher engine installation being one of the features. While there is no disputing the obvious advantages of the clear forward view thus provided, there are two drawbacks which might prove fairly serious. The passengers in the back seats will have the engine rather deafeningly close to their heads, and the small-diameter airscrew might make unsticking a little difficult, especially with a power loading of some 15 lb./h.p. It is stated that with slotted flaps the alighting speed is to be 50 m.p.h., and at the "hump speed" (usually somewhere around half of the take-off speed) airscrew efficiency is apt to be rather low, even if a four-blader is employed.

The Republic amphibian will be of all-metal construction, with the exception of the movable control surfaces, and vacuum-operated flaps are to be employed. The estimated figures are: Maximum speed, 120 m.p.h.; cruising, 105 m.p.h. Wing span, 36ft.; length, 26ft. 6in.; engine, 175 h.p. (probably Ranger); duration, 5 hours; gross weight, 2,600 lb.; price, under 4,000 dollars.

It appears open to doubt whether the gross weight of 2,600 lb. can be achieved with 5 hours' duration. Four passengers with luggage would weigh 800 lb., and 5 hours' fuel at cruising power another 300 lb., giving a disposable load of 1,100 lb. It seems unlikely that an all-metal *amphibian* four-seater could be built for a tare weight (equipped) of 1,500 lb.



The cabin of the Republic amphibian. Transparent plastics give an excellent view. The sliding tube through the dash for elevator and aileron controls makes for tidiness in the cockpit.



When retracted, the wheels tuck into wells in the sides of the hull. The small diameter of the pusher airscrew indicates need for a four-blader.

One result of the pusher arrangement is that the cross-section of the hull just aft of the airscrew must necessarily be of small area. This will presumably mean extra weight in the hull to ensure that the tail does not twist too much under the battering it will receive from the slipstream from an airscrew placed only a few feet in front of it. The nearest equivalent we have had in this country was the Shackleton-Lee Murray S.M.1, although that was not an amphibian but a strut-braced parasol landplane. We believe some trouble was experienced in connection with that arrangement.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication must in all cases accompany letters.

HORACE SAYS . . .

Span of the Super, Super Lib.

IF Horace has been busy with his slide rule he will have discovered that, according to Mr. Hearne's formula, the span of the super, super Liberator works out at 1.83 miles, and not 3.3 miles, as Horace says.

A more accurate result can be obtained by taking into account the weight of the 25,000 Libs.—$=13\times18^6$ and the wing loading$=49.5$, as well as the aspect ratio$=11.51$.

The formula then becomes:—

$$\text{Span}=\sqrt{\frac{11.51}{49.5}\times\frac{13\times10^6}{28\times10^6}}=3.3 \text{ miles},$$

and, strangely enough, there is nothing strange about it.

E. PARBURY.

ORGANISING FOR EFFICIENCY

The Designer Calls the Tune

I WAS extremely interested in the article "Organising for Efficiency," by "Indicator" (*Flight*, December 7th), and in the points of view he sets forth of the composite nature of an aircraft and in its relative component functioning as related to the whole. His criticism of the aircraft designer is surely the wrong way round, in most cases, for the simple reason that the designer calls for certain conditions to be fulfilled by the manufacturers of hydraulic, electrical and physical, etc., equipment. The designer may have to fit his ideals into the whole, but, after all, he calls the tune, and if anyone falls short of the ideal called for, it is not the designer but the makers of the accessories who have to improve their ideas.

Under the cross-heading of "Combined Operations," "Indicator" proceeds to deal with the complications of aircraft systems in the eyes of maintenance crews and the drawbacks of air transport as compared to other types of transport.

I agree that risk of catastrophic failure must ground an aircraft, but I do not agree that aircraft are going to be less reliable than any other means of transport for many years to come. On the contrary, the knowledge we have gained as a result of our war experience in the repair of aircraft—I refer to minor and major inspections, repairs on site and category "B" (rebuilds)—proves that aircraft are now being put back into service after repair and overhaul in a perfect state and to a higher standard of repair than that called for in either land- or sea-operated vehicles of any sort. Inspection is of the highest standard, as is also the workmanship throughout. All the snags one experienced in the early days of the war have vanished and in their place comes perfect order.

With every aircraft repaired or inspected, a complete stage and history book covering every stage and section of the aircraft is issued and completed. Every system, be it physical or electrical, is methodically examined, cleaned or replaced, checked and rechecked by A.I.D. Such stage and history books are supplied with every repair, inspection, or modification, and follows the aircraft.

I speak after years of actual organisation experience in the above matters, and it has been my privilege to cover every organisation and planning system in connection with the repair of aircraft. I have dealt with the design, make and application of systems to aircraft and also with all technical matters, planning of works and airfields, also with all electrical, hydraulic, oxygen, control, etc., systems in all stages, both new and repair. I say, therefore, with full knowledge, that there is no difficulty to-day in organising a system whereby every aircraft going out will be perfect in every detail.

Regarding spares, the standardisation of aircraft types and co-ordination of effort between aircraft transport and passenger operators and manufacturers will easily take care of this. As regards having spares at certain centres, this can easily be arranged by means of even elementary organisations. Whilst it is not yet in operation, I suggest that operating companies can have a breakdown plane available to proceed to any point where a breakdown has occurred. No delays need take place unless under very bad weather conditions. Don't forget that Radar and beam will play a great part in post-war operation of aircraft and will enable aircraft to take off and land under conditions which one not in the "know" still considers to be impossible.

Summarised, therefore, I make the following points: (1) There is no difficulty in organising both methods and means whereby aircraft can be sent out in perfect condition. (2) Full maintenance and inspection organisation can keep aircraft in operation *now*. (3) Physical and electrical instruments and parts can be dealt with for replacement and spares kept in stock at once. (4) The time factor in repairs and inspection would be no longer than it takes to deal with road transport. One or two spares planes would always be available in case of need. (5) Spares of all types would obviously be kept at important points and a strict control exercised to keep stock up to requirements. (6) No delays in starting a passenger or transport service need take place, as such organisation as is necessary to take care of aircraft can be put into operation *NOW*.

The résumé I have given above is but a brief outline of the subject.

E. A. FITTON, A.R.AE.S.

A CIVIL POWER PLANT

Distance of Airscrew from Leading Edge

IN C. A. H. Pollitt's article on "A Civil Power Plant," in *Flight*, December 7th, the author would appear to have overlooked one or two aerodynamic laws. Has he asked himself why some attempt has not yet been made to mount power plants approximately in the manner described?

Please correct me if I am wrong, but I have been under the impression that an airscrew must be mounted at a distance of about one-third of its blade diameter in front of the leading edge of the wing. If this is so, then the turbulence incurred by mounting the screw as close to the wing as Mr. Pollitt suggests would be tremendous—if not prohibitive. All the artist's impressions of the large screw-driven aircraft of the future show the airscrews mounted on shafts well ahead of the leading-edge (or, in some cases, well behind the trailing-edge) even when the engines are to be mounted in engine rooms inside the wings.

Also, the engine and airscrew on the Tempest are considerably further forward than on the Typhoon. This extra length cannot be put down to increased engine size, as both aircraft have Sabre Mk.II, and it would hardly have been done to allow of larger fuel capacity. So it seems likely that the Typhoon's airscrew was found to be slightly too near the leading-edge. It certainly looked to be a bit less than one-third of its diameter ahead.

The D.H. 95 Flamingo also had some treatment for nacelle/wing turbulence in the form of a semi-circular metal ring round the nacelle, to help straighten matters out. The airscrews there were rather close to the leading edge.

The point could be cleared up, and the engine mounted as shown in Mr. Pollitt's sketches, if the airscrew is mounted on an extension shaft. This would satisfy my second objection, which is that the nacelles shown are much too short and stubby for the speeds at which future transports are going to fly. A case in point is the nacelle of the Mosquito. In the Mark I the nacelle was quite big enough from the point of view of capacity, but was extended on all later marks to give better aerodynamic flow. Another case was the Beaufort, which had to have semi-circular plates fitted to even out the slipstream of too short a nacelle.

So might I suggest that the nacelles as a whole are made considerably longer, and that some, at least, of the increase in length is forward of the leading edge. Naturally, I am all for the fitting of power-units in the form of self-contained power-eggs, easily changed, and I think that the companies concerned have the matter very well in hand.

O. M. ETOE.

Rocket Power Required to Overcome Gravity

IN response to the letter from Mr. R. Spearman containing doubts as to the accuracy of Mr. K. W. Gatland's statements regarding the implications of V.2, I must put forward the following information.

A previous letter of mine (*Flight*, Feb. 10th, 1944) showed that the velocity of a rocket can be determined from the equation

$$M.\,dV = F = v\,dM$$

which, upon integration gives,

$$V = v\log_e\frac{M_o}{M_t}$$

where V is the final velocity of the rocket, v is the velocity of efflux, M_o is the original total mass of rocket plus fuel, and M_t

CORRESPONDENCE

is the mass of the rocket when the fuel is exhausted. This equation can be adopted for vertical flight and becomes,

$$V = v \log_e \frac{M_o}{M_t} - g\,t$$

In the case of a rocket projected vertically upwards, it can be shown that the velocity required for it to escape completely from the attraction of the earth (velocity of liberation) is given by,

$$V_{lib} = \sqrt{2\,g\,r}$$

where g is the gravitational acceleration at the surface of the earth, and r is the radius of the earth. Substitution of known values will give the velocity of liberation as 11.1 kilometres per second (6.95 miles per second) slightly less than the 7.5 miles per sec. of Mr. Spearman.

Having recollected these equations it is possible to apply the known details concerning V.2 to them. First, however, it is necessary to adopt a figure for the efflux velocity, which is not difficult to estimate. Ethyl alcohol and liquid oxygen burning together should yield 1970 calories. The jet velocity is according to the equation,

$$v_t = \sqrt{2\,H\,J}$$

where H is the heat yield per gramme mol., and J is the mechanical equivalent of the calorie. The theoretical efflux velocity (v_t) is thus found to be 4.0 kilometres per second.

The thermal efficiency of a rocket engine is according to the expression,

$$E_{th} = \left(\frac{v}{v_t}\right)^2$$

and in 1940 the American Rocket Society were obtaining efficiencies of 40 per cent. No doubt the Germans using, as they do, a turbine pressure pump for the fuel feed, exceed this figure. A conservative estimate may be 50 per cent so that the actual jet velocity will be 2.82 kms/sec.

The official details of V.2 give 8½ tons as the amount of fuel and 12 tons as the original weight of the rocket plus fuel. The load ratio (R) will thus be 3.42. It is also reported that the time of burning is less than 60 seconds, and proceeding from these figures it is possible to calculate the final velocity, namely,

$$V = (2.82 \log_e 3.42) - 0.456 \text{ kms/sec.}$$

giving 4.776 kms/sec. Allowing that some of the complex equipment necessary for the horizontal trajectory can be omitted in vertical flight, and also for the effects of air resistance, this figure will be reduced to about 4.5 kms/sec.

At a height of about 100 miles (160 kms.), there will thus be a projectile travelling vertically upwards at a velocity of 4.5 kilometres per second. This projectile will weigh 3½ tons, of which 1 ton comprises a smaller rocket taking the place of the normal warhead. The mass ratio of this small rocket can be calculated in order that it may escape from the earth. Air resistance can be neglected at this height. Rearranging the second equation gives,

$$R = \frac{M_o}{M_t} = e^{\frac{V_{lib.}}{v}}$$

As the small rocket is already travelling at 4.5 kms/sec. due to its upward motion inside the large rocket, the additional velocity required for liberation is only 6.6 kms/sec. Assuming the same efficiency as before,

$$R = e^{2.34} = 10 \text{ (approx.)}$$

If the total weight of the small rocket is 1 ton (2000 kgms.), then there must be 1800 kgms. of this fuel, and 200 kgms. rocket and payload. 50 kgms. of the payload could be flash powder arranged to explode upon impact with the surface of the Moon.

The slight discrepancies between these figures and those of Mr. Gatland arise, of course, due to the fact that he assumed a total weight of 15 tons instead of the 12 tons now officially released.

Regarding your correspondent's final remarks concerning the effects of acceleration. Slight consideration will show that Mr. Spearman's observations are far from being correct. Consider first the acceleration of V.2 on this hypothetical vertical trajectory. The minimum acceleration will be experienced at the beginning of the flight when the weight is greatest. The acceleration will then be,

$$a = \frac{26 - 12}{12} = 1.17\,g$$

and the maximum acceleration will be when all the fuel has been nearly exhausted. The thrust at this stage will still be the same, namely, 26 tons, so that,

$$a = \frac{26 - 3.5}{3.5} = 6.4\,g$$

Both these figures being nowhere near to the limit which the human body can withstand. Of interest it is to recall an article by Mr. F. C. Sheffield ("G-men of the Air," *Flight*, 12th Feb., 1942), where it is stated that aeronautical research has proved that the human body may withstand an acceleration of 14–16 *g* for 120–180 secs. if in the prone position. From the well-known equation, $v = at$, it can be seen that in 150 seconds at 15 *g*'s the human body can be safely accelerated to a velocity of 171 kms/sec., much more than is required for a voyage to the Moon.

E. BURGESS,
President, the Combined British Astronautical Societies.

[1 ton = 1,016 kgms, which affects the value of R.—ED.]

AIRBORNE OUNCES

Open Cage or Airtight Box?

IN response to Jonathan Peel *re* the perched and airborne canary, I think the solution is simple. The cage and canary airborne equals 20 oz., i.e., the weight of the cage, because the air displaced by the canary flapping its wings would pass out through the bars of the cage.

If, however, it were in an airtight box and flew around, the weight would be 21 oz. Possibly when the bird was "taking off" the scales would register over 21 oz. (presuming box equals 20 oz. and bird 1 oz., of course) because the downward thrust transmitted through his feet would have to be taken into account—also the weight of the volume of air, but this problem is more in Horace's line than mine.

ROY E. FFRENCH DENITT.

Newton's Third Law Again

THE problem raised by your correspondent, Mr. Jonathan Peel, in the December 14th issue of *Flight*, is a hardy old perennial that can usually be relied on to provoke an argument in any place where mathematicians congregate. Following is my analysis, which I believe to be correct.

It involves an application of Newton's Third Law, which may be stated accurately thus: If a body A acts on a body B with a force F, then B reacts on A with an equal and opposite force −F; or, more usually, as: Action and Reaction are equal and opposite.

Taking the weights of cage and bird to be 20 oz. and 1 oz. as suggested by Mr. Peel, then clearly when the bird is perched the total weight registered will be 21 oz. Now suppose the bird becomes airborne, and consider the forces acting at an instant when the vertical component of the acceleration of the bird is nil. For vertical equilibrium of the bird, the air must be exerting upwards on the bird a force equal to the weight of the bird, namely, 1 oz. weight, and hence, by Newton's Third Law, the bird must be exerting on the air an equal and opposite force of 1 oz. weight downwards.

Now consider the forces acting on the mass of air in the cage. The air, considered a whole, is in equilibrium, and is being acted on by the bird with a force of 1 oz. weight downwards, and thus there must be a balancing force of 1 oz. weight exerted upwards on the air by the floor of the cage; hence, again by Newton's Third Law, the air must exert an equal and opposite force on the cage, that is, a force of 1 oz. weight downwards. Thus the total force registered by the scales will be the weight of the cage (20 oz.) plus this force of 1 oz. weight—21 oz. in all, as before.

If the bird is flying so that there is a vertical component of acceleration upwards, the apparent weight will be increased by a force sufficient to produce this acceleration, and similarly, if a vertical component of acceleration downwards is present, the apparent weight will be decreased.

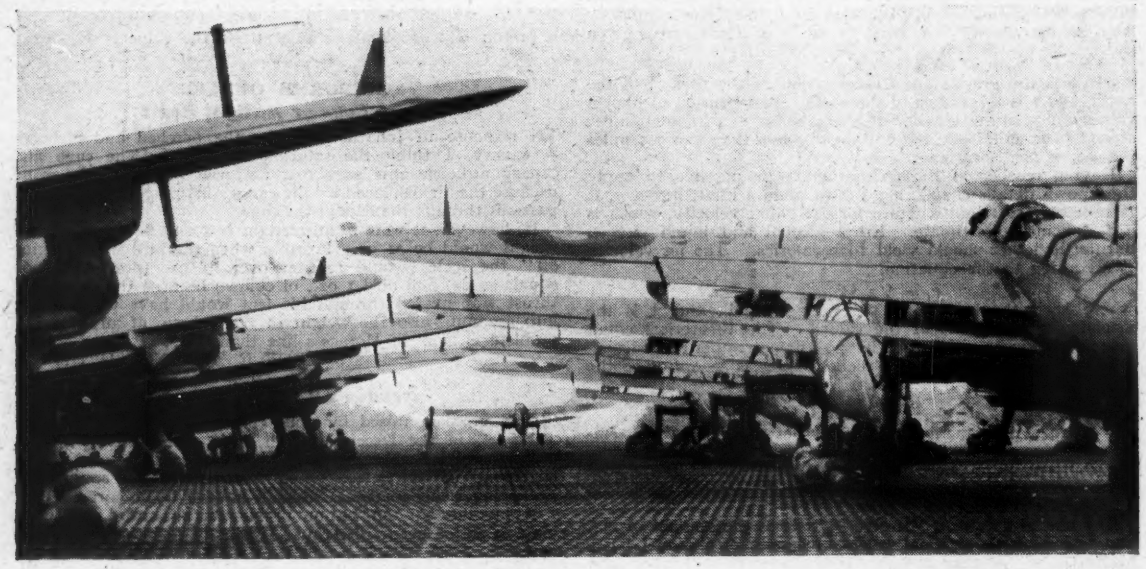
I do not know how this result can be demonstrated experimentally for a bird in a cage, but a rough analogy is furnished by a well-known experiment in support of Archimedes' principle. If a body, say a metal ball, is weighed in air and then in a beaker of water, the beaker being supported on a stand, the ball will suffer an apparent loss in weight equal to the weight of water displaced; this apparent loss in weight is a measure of the upthrust of the water on the ball. If now the ball is supported on a stand, so that the balance is not affected by the weight of the ball, and the beaker and water weighed (1) by themselves, (2) with the ball immersed in the water, it will be found that the apparent weight of the beaker and water is increased. This apparent increase in weight is a measure of the downthrust of the water on the beaker, and will be found to be equal to the weight of water displaced by the ball. This demonstrates that the upthrust of the water on the ball is equal to the downthrust of the water on the beaker.

The analogy is not exact, but is a useful illustration of the principles involved.

C. L. BROKENSHAW.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements



SERRIED RANKS : A Barracuda squadron practising flight-deck take-off at a Royal Naval Air Station in the Tropics.

Promotion

GENERAL DUTIES BRANCH.

Air Comdre. (temp.) (Act. Air Vice-Marshal) M. L. TAYLOR, C.B.E., A.F.C., is granted the rank of Air Commodore (war subs.), November 17th, 1944.

Appointments

THE Air Ministry announces the following appointments:—

Air Vice-Marshal Sir B. BAKER, K.B.E., C.B., D.S.O., M.C., A.F.C., to be A.O.C., East Africa.

Air Vice-Marshal F. H. M. MAYNARD, C.B., A.F.C., to be A.O.C. of a group in Coastal Command.

Air Vice-Marshal H. S. KERBY, C.B., D.S.C., A.F.C., to be Air Officer-in-Charge of Administration, Coastal Command.

Act. Air Vice-Marshal R. A. GEORGE, C.B.E., M.C., to be A.O.C., Iraq and Persia.

Air Comdre. G. P. H. CARTER to the command of a base in Bomber Command.

Air Comdre. J. W. F. MERER to the command of a base in Bomber Command.

Act. Air Comdre G. H. VASSE to be Senior Air Staff Officer of a group in S.E. Asia.

Act. Air Comdre. S. L. G. POPE, D.F.C., A.F.C., to the command of a base in Bomber Command.

Group Capt. R. L. MILLS to the headquarters of a group in Asia, and to be Act. Air Commodore.

Group Capt. R. A. YOUNG to be Senior Maintenance Staff Officer of a group in Maintenance Command, and to be Act. Air Commodore.

Group Capt. R. G. SEYMOUR to be Deputy Air Officer in charge of administration, M.A.A.F., and to be Act. Air Commodore.

Awards

Fleet Air Arm

THE KING has been graciously pleased to approve the following awards for courage, resolution and skill in Northern waters:—

Second Bar to Distinguished Service Cross

Lt. Cdr. (A) R. E. BRADSHAW, D.S.C., R.N.

Distinguished Service Cross

Temp. Sub. Lt. (A) D. G. JUPP, R.N.V.R.

Royal Air Force

THE KING has been graciously pleased to approve the following awards in recognition of gallantry and devotion to duty in the execution of air operations:—

Bar to Distinguished Service Order

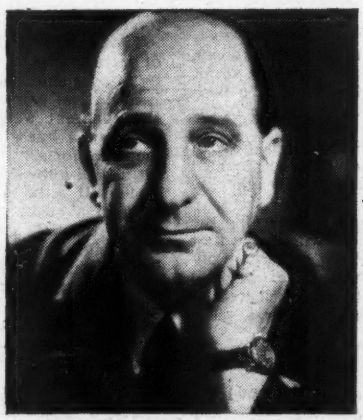
Act. Wing Cdr. C. M. WIGHT-BOYCOTT, D.S.O., R.A.F.V.R., No. 25 Sqn.—Since assuming command of his squadron Wing Cdr. Wight-Boycott has displayed outstanding leadership, skill and devotion to duty. His squadron during this period has destroyed at least 20 enemy aircraft, damaged others, and has also accounted for 22 flying bombs. During 1944, Wing Cdr. Wight-Boycott has himself destroyed two Junkers 188's and a Messerschmitt 410, in addition to two flying bombs. Most of his work has been accomplished in adverse weather, frequently many miles out to sea. His example of personal courage has been noteworthy at all times.

Distinguished Service Order

Act. Wing Cdr. E. R. BAKER, D.F.C., R.A.F.O. (since reported missing).—Since being awarded a bar to the D.F.C. in August, 1943, this officer has led a large number of fighter-bomber attacks against enemy shipping and constructional targets and has personally destroyed three enemy aircraft. In October, 1943, Wing Cdr. Baker carried out a hazardous attack at point blank range on enemy shipping under heavy fire, to score a direct hit. By his outstanding leadership, courage and determination he has set a splendid example to his officers and men.

Sqn. Ldr. R. H. BUNKER, D.F.C., R.A.F.O., No. 620 Sqn.—Sqn. Ldr. Bunker has a long record of distinguished flying service. He is an excellent flight commander and his sense of responsibility and discipline has raised the whole level of efficiency in his flight. In September, 1944, he was second of a formation engaged in dropping supplies to our forces in Holland, when his aircraft was damaged by anti-aircraft fire and had one engine put out of action. The leading aircraft was forced to land and, despite the damage to his own aircraft, Sqn. Ldr. Bunker took over the leading position and completed the mission successfully. Throughout his whole operational career, he has shown outstanding courage and determination in pressing home his attacks.

Act. Sqn. Ldr. J. S. R. MULLER-ROWLAND, D.F.C., R.A.F.V.R., No. 211 Sqn. (since reported missing).—Since the award of a bar to the Distinguished Flying Cross, Sqn. Ldr. Muller-Rowland has completed many more operational missions. He has, consistently, shown a fine fighting spirit and, flying through adverse weather, has on many occasions caused confusion of the enemy's supply lines. He has destroyed three enemy aircraft and damaged others, as well as causing much damage to enemy transport and locomotives. Sqn. Ldr. Muller-Rowland's enthusiasm for operational flying, together with his leadership in the face of danger, has contributed much to the success of his squadron.



Air Vice-Marshal C. E. H. Medhurst, C.B., O.B.E., M.C., who is Commandant of the Royal Air Force Staff College.

Bar to Distinguished Flying Cross

Act. Wing Cdr. G. R. A. McG. JOHNSTON, D.S.O., D.F.C., R.A.F.V.R.—Since being awarded the D.S.O. this officer has led large formations of aircraft on very many sorties during which outstanding success has been achieved, including the destruction of 53 enemy aircraft. In attacks on targets on the ground some 600 rail cars, 97 locomotives, and more than 1,000 mechanical vehicles have been put out of action; 93 barges have been sunk and very many more damaged. These achievements are a splendid tribute to Wing Cdr. Johnston's brilliant leadership, outstanding ability and courageous example which has inspired all.

Act. Wing Cdr. W. W. J. LOUD, D.F.C., R.A.F.V.R., No. 19 Sqn.—This officer is a skilful and determined leader whose fine qualities have contributed in a large way to the high standard of operational efficiency of the squadron he commands. Within a period of a few weeks the squadron has inflicted severe losses on the enemy, including the destruction of 19 enemy aircraft, 30 locomotives, and more than 200 mechanical vehicles. By his inspiring leadership, Wing Cdr. Loud has played a worthy part in the successes obtained.

Act. Wing Cdr. C. W. McN. NEWMAN, D.F.C.,

R.A.F., No. 613 Sqn.—Since the invasion of Northern France, Wing Cdr. Newman has participated in very many sorties, involving attacks on a wide range of targets in the battle area. Throughout this officer has continued to display a high degree of skill and courage, qualities which have contributed much to the successes obtained.

Sqn. Ldr. H. J. DOWDING, D.F.C., R.C.A.F., No. 442 (R.C.A.F.) Sqn.—This officer continues to display the highest standard of skill, courage and devotion to duty. His example has greatly inspired the squadron which, within a period of a few weeks has inflicted much loss on the enemy. More than 500 mechanical vehicles have been put out of action, many of them by Sqn. Ldr. Dowding. In addition this officer destroyed two of the 19 enemy aircraft which were shot down by the squadron during the period.

Act. Sqn. Ldr. D. H. DOVER, D.F.C., R.C.A.F., No. 412 (R.C.A.F.) Sqn.—Sqn. Ldr. Dover, now on his second tour of operational duty, has proved an outstanding leader, both in the air and on the ground. His great skill, coolness and tactical ability have contributed materially to the success of the squadron which within a short period has put out of action some 528 enemy vehicles. In addition three enemy aircraft have been destroyed. By his outstanding keenness, iron determination and untiring devotion to duty, Sqn. Ldr. Dover has set a splendid example to all.

Act. Sqn. Ldr. W. J. JOHNSON, D.F.C., R.A.F.V.R., No. 257 Sqn.—This officer has participated in very many sorties since being awarded the D.F.C. He has led the squadron in many attacks on vital targets in support of our ground forces, including attacks on bridges, strong points and road and rail communications. Throughout he has displayed inspiring leadership, great courage and unswerving devotion to duty.

Act. Sqn. Ldr. W. LYLE, R.A.F., No. 226 Sqn. —Sqn. Ldr. Lyle has completed a large number of sorties, involving attacks on a variety of targets such as power stations, airfields, shipping and lines of communication. In July, 1944, whilst leading a formation of aircraft against an enemy target, heavy and accurate anti-aircraft fire was encountered. His aircraft was struck and sustained damage, and his navigator was wounded. Nevertheless, he continued with his task, and safely brought his formation to base without further incident. Sqn. Ldr. Lyle has consistently displayed great skill and devotion to duty.

Act. Sqn. Ldr. J. W. MURRAY, D.F.C., D.F.M., No. 21 Sqn.—This officer has completed many sorties on his third tour of operational duty, most of which have been attacks on rail and road transport in or near the battle area. He has displayed notable skill, and has invariably pressed home his attacks with great courage and determination. On more than one occasion his aircraft has been damaged by anti-aircraft fire, but he has completed his mission successfully.

Act. Sqn. Ldr. J. B. NIVEN, R.A.F.V.R., No. 485 (N.Z.) Sqn.—This officer is a highly efficient and zealous squadron commander. He has led his formation in many sorties and much loss, including the destruction of nine aircraft and a large number of mechanical vehicles, has been inflicted on the enemy. He is a brave and resourceful leader, whose tactical ability has played a good part in the good results obtained.

Flt. Lt. H. DAVIES, D.F.C., R.A.F.V.R., No. 175 Sqn.—Flt. Lt. Davies has commanded his flight in an exemplary manner. He has completed a very large number of sorties, involving attacks on flying bomb installations and radio buildings, railways, and a variety of other targets on the ground. He has invariably displayed a high standard of skill and courage, and throughout his devotion to duty has been unflagging.

Flt. Lt. W. T. KIERSY, D.F.C., R.C.A.F., No. 401 (R.C.A.F.) Sqn.—This officer is a keen and courageous fighter. He has completed a large number of sorties, and his successes include the destruction of seven enemy aircraft and many mechanical vehicles. His example of determination and devotion to duty has been of a high order.

Flt. Lt. R. D. MATTOCK, D.F.C., R.A.F.V.R.— In October, 1944, Flt. Lt. Mattock was captain of an aircraft detailed to photograph the seawall at West Kappelle shortly after the attack of the main bombing force. In the run-in his aircraft was hit in the tail by an anti-aircraft shell. Despite this, Flt. Lt. Mattock cooly continued his task. Although his aircraft was continually fired upon by the enemy's batteries, this resolute pilot spent much time over the target to secure excellent photographs. This officer has completed a large number of sorties, and has set a fine example of courage and devotion to duty.

Flt. Lt. A. E. C. WHEELER, D.F.C., R.A.F.V.R., No. 21 Sqn.—Flt. Lt. Wheeler has recently completed a second tour of operational duty. In the course of his assignments he has executed many successful attacks on enemy airfields, railways and road transport. He has at all times shown the greatest keenness, and his example of skill and tenacity has won great praise.

Act. Sqn. Ldr. W. A. TRILSBACH, D.F.C., R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.—Sqn. Ldr. Trilsbach has consistently maintained a high standard of zeal and efficiency as pilot, captain of aircraft and flight commander. He has completed many successful missions since the award of the D.F.C. and has always pressed home his attack with skill and determined vigour. His record is one of sustained endeavour.

Flt. Lt. G. L. P. DUNSTONE, D.F.C., R.A.F.V.R., No. 61 Sqn.—Since the award of the D.F.C. Flt. Lt. Dunstone has completed fifteen sorties on his third tour of operations. From December, 1943, he has been signals leader of his squadron, in which capacity he has set a splendid example to his section. In February, 1944, his aircraft was detailed to attack a target in Berlin. On the outward journey the rear gunner collapsed. Although in an exhausted condition himself, this officer assisted in rendering first aid to the gunner. His skill, enthusiasm and courage in the face of the enemy merit high praise.

FRONT-LINE WEAPON: Unloading an R.A.A.F. bulldozer on Morotai Island in the Halmaheira group N.W. of New Guinea. During attacks on Japanese-held islands, these bulldozers frequently have to make airstrips only a mile or so from the front line.

Flt. Lt. G. H. W. GLENN, D.F.C., R.A.F.V.R., No. 139 Sqn.—Flt. Lt. Glenn has completed a second tour of operational duty during which his aircraft attacked targets in Berlin seventeen times. He has proved himself a pilot of considerable ability, who has always displayed courage and devotion to duty of a high order. On more than one occasion he has flown his aircraft to a safe landing in this country after one engine had failed through enemy action while deep in German territory.

Flt. Lt. W. H. HILL, D.F.C., R.A.F., No. 640 Sqn.—Over a long period of operational flying, Flt. Lt. Hill has shown outstanding enthusiasm and devotion to duty of the highest order. An air bomber of great skill and determination, he has given valuable help and guidance to less experienced crews.

Flt. Lt. R. H. PHILLIPS, D.F.C., R.A.F.V.R. No. 571 Sqn.—Flt. Lt. Phillips has displayed qualities of captaincy and leadership of the highest order. Undeterred by the most difficult and hazardous circumstances, he has consistently set a fine example to all by his high courage and determination.

Flt. Lt. H. L. PLIMMER, D.F.C., R.A.F., No. 105 Sqn.—Since the award of the D.F.C. Flt. Lt. Plimmer has participated in numerous attacks on many vital targets. An efficient and skilful navigator, he has always shown outstanding qualities of determination, courage and fortitude under the most difficult circumstances.

Flt. Lt. R. H. SMITH, D.F.C., R.A.F.V.R., No. 692 Sqn.—Since the award of the D.F.C. this officer has participated in many further sorties on important German targets. He has consistently displayed resolution and courage of a high order and the successes achieved by his crew have been largely due to his skilful and accurate navigation under all conditions. Flt. Lt. Smith's continued determination and devotion to duty merit high commendation.

Act. Flt. Lt. W. S. BRECKENRIDGE, D.F.C., R.A.F.V.R., No. 626 Sqn.—Flt. Lt. Breckenridge has completed many operational sorties since the award of the D.F.C. On more than one occasion his aircraft has been damaged by enemy fighters and anti-aircraft fire. He has displayed consistently skilful pilotage, cool judgment and courage of the highest order. A fine leader and fearless captain, this officer has welded his crew into an outstanding fighting unit which is an example to the squadron.

Act. Flt. Lt. R. E. CROMPTON-BATT, D.F.C., R.A.F.V.R., No. 7 Sqn.—Since the award of the D.F.C. this officer has taken part in many more operational sorties. He is an excellent navigator, whose outstanding skill, fortitude and dogged determination have materially contributed to the successes achieved by his crew.

Act. Flt. Lt. G. A. A. HOWE, D.F.C., R.A.F.V.R., No. 7 Sqn.—Flt. Lt. Howe has made a very important contribution to his squadron's success. He has a fine record of operations. An outstanding air gunner, his skill and accuracy have set a high example to all members of his squadron.

Act. Flt. Lt. J. E. TIPTON, D.F.C., R.A.F.V.R., No. 109 Sqn.—Flt. Lt. Tipton has proved himself a navigator of fine ability. He has completed his second successful operational tour. His work has called for courage and endurance of a high order and his fine record has earned him a reputation for accuracy and reliability.

Act. Flt. Lt. C. G. WHITEHEAD, D.F.C., R.A.F.V.R., No. 635 Sqn.—Since the award of the D.F.C., Flt. Lt. Whitehead has completed many operational sorties. His skill and accurate navigation have undoubtedly played a large part in the successes achieved by his crew. He has continued to display the utmost determination to operate against the enemy and unfailing devotion to duty, which have set a commendable example to all.

F/O. R. A. MARSHALL, D.F.C., R.A.F.V.R., No. 619 Sqn.—F/O Marshall is now on his second operational tour. Since the award of the D.F.C. he has participated in many sorties which have required deep penetration into enemy territory. His accurate and skilful navigation has largely contributed to the success of the missions. As deputy navigation leader, he has spared no effort to increase the standard of navigation in his section with the resultant excellent record of his squadron. On one occasion in May, 1944, his aircraft was damaged by anti-aircraft fire and one engine failed. Although some of his equipment was rendered unserviceable, this officer ably navigated his bomber to the target. An effective attack was accomplished and the return flight to base safely completed.

W/O. A. J. IRWIN, D.F.C., R.A.F.V.R., No. 582 Sqn.—Since being awarded the D.F.C., W/O. Irwin has participated in many more operational sorties, the majority of which have been against important and heavily defended targets. An air gunner of outstanding keenness, he has always displayed a high standard of technical efficiency, skill and devotion to duty.

Act. Group Capt. R. J. LANE, D.S.O., D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.—Group Capt. Lane has completed many attacks on heavily defended targets in Germany. He has consistently displayed a fine fighting spirit throughout his operational career and has proved himself an officer of outstanding ability whose courage, cheerfulness and keen sense of duty have been an inspiration to his crews.

Act. Sqn. Ldr. M. W. PETTIT, D.F.C., R.C.A.F., No. 432 (R.C.A.F.) Sqn.—Since the award of the D.F.C., Sqn. Ldr. Pettit has completed many attacks on heavily defended targets. He has displayed outstanding qualities of courage, skill and determination. His operational record during both of his tours has set an inspiring example to all the members of his squadron.

Flt. Lt. A. M. BEACH, D.F.C., R.C.A.F., No. 139 Sqn.—This officer has a long record of successful sorties against a variety of targets, including fifteen on Berlin. He has now completed a second tour of operational duty. On numerous occasions he has participated in attacks on heavily defended targets and secured valuable photographs. At all times an outstanding navigator, Flt. Lt. Beach has continued to show admirable keenness and devotion to duty.

SERVICE AVIATION

Flt. Lt. A. J. P. BYFORD, D.F.C., R.C.A.F., No. 419 (R.C.A.F.) Sqn.—This officer is an outstanding pilot and captain of aircraft. He has attacked, among other targets, Berlin, Leipzig, Frankfurt and objectives in the Ruhr and has always pressed home his attacks with fine skill and determination. His example of fearlessness and imperturbability has made a noteworthy contribution to the high morale prevailing in his squadron.

Flt. Lt F. R. HARRIS, D.F.C., R.C.A.F., No. 78 Sqn.—This officer has attacked many of the most heavily defended targets and has at all times pressed home his attacks despite the fiercest enemy opposition. He has achieved consistently good results and his unfailing courage and leadership have set a fine example to all.

Act. Flt. Lt. E. W. GARRETT, D.F.C., R.C.A.F., No. 109 Sqn.—Throughout many attacks against major enemy targets, Flt. Lt. Garrett has consistently displayed courage and devotion to duty of a high order. A zealous and efficient navigator, this officer's keenness to operate against the enemy has set a fine example to all his squadron.

Distinguished Flying Cross

P/O. A. E. DAVIDSON, R.C.A.F., No. 625 Sqn.
P/O. G. DYKES, R.C.A.F., No. 333 (R.C.A.F.) Sqn.
P/O. L. E. FORD, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
P/O. H. D. F. FRITH, R.A.F., No. 434 (R.C.A.F.) Sqn.
P/O. J. C. GORDON, R.C.A.F., No. 12 Sqn.
P/O. N. L. GURSKI, R.C.A.F., No. 51 Sqn.
P/O. R. T. GRAY, R.C.A.F., No. 640 Sqn.
P/O. G. P. HABTFORD, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
P/O. T. HAWTHORNE, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
P/O. M. L. HUSBAND, R.C.A.F., No. 578 Sqn.
P/O. W. T. KRANTZ, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
P/O. J. B. A. LAMOUREUX, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
P/O. P. E LIWISKI, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
P/O. J. C. LOUBERT, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
P/O. J. J. MCGILLIVRAY, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
P/O. G. T. MARSHALL, R.C.A.F., No. 434 (R.C.A.F.) Sqn.
P/O. A. T MATHEWS, R.C.A.F., No. 166 Sqn.
P/O. F. E. MICHAEL, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
P/O. W. D. MILLER, R.C.A.F., No. 434 (R.C.A.F.) Sqn.
P/O. S. PUSKAS, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
P/O H. C REDMOND R.C.A.F., No. 9 Sqn.
P/O. C A. REID, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
P/O. J K RICHARDS, R.C.A F., No. 218 Sqn.
P/O. K. P. ROLLO, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
P/O. J. E. SLED, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
P/O. G B. SMEATON, R.C.A.F., No. 433 (R.C.A.F.) Sqn.
P/O. J. S. M. SMITH, R.C.A.F., No. 434 (R.C.A F.) Sqn.
P/O. G. C. SOUTHCOTT, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
P/O. J. W. STEUART, R.C.A.F., No. 12 Sqn.
P/O. C. R. SWAYZE, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
P/O. E. G. VAUGHAN, R.C.A.F., No. 408 R.C.A.F.) Sqn.
F/O. R. K CRAW, No. 7 Sqn.
F/O. G. E. GIBSON, No. 7 Sqn
F/O. N. J. GRANT, No. 166 Sqn.
P/O. K. S. WEIR, R.C.A.F., No. 12 Sqn.
W/O.2 K. J. BONGARD, R.C.A.F., No. 78 Sqn.
W/O.2 R. W. BURTON, No. 424 (R.C.A.F.) Sqn.
W/O. (now P/O.) R. E. CARMICHAEL, R.C.A.F., No. 106 Sqn.
W/O (now P/O.) A. W. CODE, R.C.A.F., No. 101 Sqn.
W/O.1 W. H. KING, R.C.A.F., No 405 (R.C.A.F.) Sqn.
W/O. D. I. MCLEOD, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
W/O.1 G. E. REID, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
W/O.2 (Now P/O.) A. M. SCOTT, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
W/O J S. TITUS, R.C.A.F., No 432 (R.C.A.F.) Sqn.
F/O. H. C E THURSTON, R.N.Z.A.F., No. 7 Sqn.
Act. F/O W G. O'BRIEN, R.N.Z.A.F., No. 622 Sqn.
Act. F/O. L M. O'CONNOR, R.N.Z.A.F., No. 75 (N.Z.) Sqn
P/O. R. A. MCFARLANE, R.N.Z.A.F., No. 460 (R.A.A.F.) Sqn.
P/O. L. M. PETRY, R.N.Z.A.F., No. 514 Sqn.
W/O. R. F. GOULD, R.N.Z.A.F., No. 115 Sqn.
Act. W/O S. N. ETRIDGE, R.N.Z.A.F., No. 7 Sqn
Group Capt. H. H. BROOKES, R.A.F.
Sqn. Ldr. P. A NICHOLAS, R.A.F.O.
Sqn. Ldr. A. H. C. ROBERTS, R.A.F.O.
Act. Sqn. Ldr J. D. BOLTON, R.A.F.V.R., No. 608 Sqn
Act. Sqn Ldr. P D CARDEN, R.A.F.V.R., No. 15 Sqn.
Act. Sqn. Ldr. N. H. CORRY, R.A.F.V.R., No. 12 Sqn.
Act. Sqn Ldr V. G CANE, R.A.F.O.
Act. Sqn. Ldr. W H. HARRIS, R.A.F.V.R., No. 35 Sqn.
Act. Sqn. Ldr. H. C. HILL, R.A.F.V.R., No. 7 Sqn.
Act. Sqn. Ldr. W. J. MCFETRIDGE, R.A.F.V.R., No. 115 Sqn.
Act. Sqn. Ldr. R. E. MILLICHAP, R.A.F.V.R., No. 630 Sqn
Act. Sqn. Ldr. N. S. MINGARD, R.A.F.V.R., No. 582 Sqn.
Act. Sqn. Ldr. P. A. RIPPON, R.A.F.V.R., No. 166 Sqn.
Act. Sqn. Ldr. J. J. WOODS, R.A.F., No. 7 Sqn.
Flt. Lt. A. R. C. ANDREWS, R.A.F.V.R., No. 76 Sqn.
Flt. Lt. A. W AVERY, R.A.F.V.R., No. 625 Sqn.
Flt. Lt. W. BAKER, R.A.F., No. 105 Sqn.
Flt. Lt. C. G. CLARK, R.A.F.V.R., No. 192 Sqn.
Flt. Lt. R. W. COUTTS, R.A.F.V.R., No. 635 Sqn.
Flt. Lt. F. R. DAVY, R.A.F.V.R., No. 625 Sqn.
Flt. Lt. J. C. FAIRGRIEVE, R.A.F., No. 158 Sqn.
Flt. Lt. G. A. M. GALLOP, R.A.F., No. 15 Sqn.
Flt. Lt. L. GATRILL, R.A.F.V.R., No. 109 Sqn.
Flt Lt. J. E. T. MANSFIELD, R.A.F.V.R., No. 12 Sqn.
Flt. Lt. J. T. A. MARSDEN, R.A.F.V.R., No. 103 Sqn.
Flt. Lt J W. MARTIN, R.A.F.V.R., No. 630 Sqn.
Flt. Lt. H. D. MUIR, R.A.F.V.R., No. 100 Sqn.
Flt. Lt. W. A. RAINEY, R.A.F.V.R., No. 567 Sqn.
Flt. Lt. H. F. G C. RUSSELL, R.A.F.V.R., No. 218 Sqn.
Flt. Lt. J. H. THOMAS, R.A.F.V.R., No. 12 Sqn.
Flt. Lt. L H V. WOOD, R.A.F.V.R., No. 630 Sqn.
Act. Flt. Lt. L. H. CHESTER, R.A.F.V.R., No. 156 Sqn.
Act. Flt. Lt. R. W. DUNCANSON, R.A.F.V.R., No. 432 (R.C.A.F.) Sqn.
Act. Flt. Lt. L. E. FLATT, R.A.F.V.R., No. 7 Sqn.
Act. Flt. Lt. I. C. GILCHRIST, R.A.F.V.R., No. 5[illegible] Sqn.

FIRST BLOOD : F/O. G. A. Whitman, R.C.A.F., one of the first three Tempest pilots each to shoot down an Me 109 during the Tempest's first combats over Normandy during the invasion.

Act. Flt. Lt. R. L. GRAHAM, R.A.F.V.R., No. 166 Sqn.
Act. Flt. Lt. G. HALL, R.A.F.V.R., No. 582 Sqn.
Act. Flt. Lt. A. J. HISCOCK, R.A.F.V.R., No. 156 Sqn.
Act. Flt. Lt. G. W. HODGES, R.A.F.V.R., No. 156 Sqn.
Act. Flt. Lt. E. HOWELL, R.A.F.V.R., No. 138 Sqn.
Act. Flt. Lt. J. W. LANDON, R.A.F.V.R., No. 12 Sqn.
Act. Flt. Lt. D. E. MILLER, R.A.F.V.R., No. 7 Sqn.
Act. Flt. Lt V. MOSS, R.A.F.V.R., No. 576 Sqn.
Act. Flt. Lt. W. G. NEAL, R.A.F V.R., No. 156 Sqn.
Act. Flt. Lt. E. W. NOLDE, R.A.F.V.R., No. 7 Sqn.
Act. Flt. Lt. W. C. PARKE, R.A.F.V.R., No. 15 Sqn.
Act. Flt. Lt. K. H. REYNOLDS, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.
Act. Flt. Lt. R. S. SANDERS, R.A.F.V.R., No. 78 Sqn.
Act. Flt Lt J. E. SCRIVENER, R.A.F.V.R., No. 156 Sqn.
Act. Flt. Lt A. TURNER, R.A.F.V.R., No. 199 Sqn.
Act. Flt. Lt. R L. VINES, R.A.F.V.R., No. 635 Sqn.
Act. Flt. Lt. C. G. WHITAKER, R.A.F.V.R., No. 635 Sqn.
Act. Flt. Lt. A. P. T. WILLOUGHBY, R.A.F.V.R., No. 154 Sqn.
F/O. N. BALLANCE, R.A.F., No. 50 Sqn.
F/O. A. F. BLACKMAN, R.A.F.V.R., No. 578 Sqn.
F/O. J. W. BLANCHARD, R.A.F.V.R., No. 166 Sqn
F/O. P. BROWN, R.A.F.V.R., No. 103 Sqn.
F/O. J. A. R. CARRAD, R.A.F.V.R., No. 156 Sqn
F/O. M. H. CLARK, R.A.F.V.R., No. 578 Sqn.
F/O. J. S. COOK, R.A.F.V.R., No. 207 Sqn.
F/O. E. E. COURT, R.A.F.V.R., No. 156 Sqn.
F/O. G. R. DAVIES, R.A.F.V.R., No. 300 Sqn.
F/O. H. DAVIES, R.A.F.V.R., No. 101 Sqn.
F/O. W. J. DAVIS, R.A.F.V.R., No. 50 Sqn
F/O. C. E. DAW, R.A.F.V.R., No. 78 Sqn.
F/O. W. R. DRINKWATER, R.A.F.V.R., No. 7 Sqn.
F/O. R. H. L'E. FAWCETT, R.A.F.V.R., No. 78 Sqn.
F/O. K. L. FOX, R.A.F.V.R., No. 166 Sqn.
F/O. M. GASKIN, R.A.F.V.R., No. 161 Sqn.
F/O. J. R. GIBBONS, R.A.F.V.R., No. 103 Sqn.
F/O. D. W. GRANT, R.A.F.V.R., No. 7 Sqn.
F/O. L. D. HALL, R.A.F.V.R., No. 161 Sqn.
F/O. P. HALL, R.A.F.V.R., No. 105 Sqn.
F/O. J. A. HIGGS, R.A.F.V.R., No. 78 Sqn.
F/O. L. G. HOLMES, R.A.F.V.R., No. 166 Sqn.
F/O. K. J. HOVERS, R.A.F.V.R., No. 192 Sqn.
F/O. A. HUNTER, R.A.F.V.R., No. 77 Sqn.
F/O. K. M. JAMES, R.A.F.V.R., No. 138 Sqn.
F/O. J. J. JOBLING, R.A.F.V.R., No. 582 Sqn.
F/O. E. C. G. JONES, R.A.F.V.R., No. 426 (R.C.A.F.) Sqn.
F/O. E. T. JONES, R.A.F.V.R., No. 15 Sqn.
F/O. W. F. JOWSEY, R.A.F.V.R., No. 428 (R.C.A.F.) Sqn.
F/O. E. S. KEMP, R.A.F.V.R., No. 578 Sqn.
Act. Sqn. Ldr. J. T. BROPHY, R.A.A.F., No. 462 (R.A.A.F.) Sqn.
Act. Flt. Lt. P. J. BOWERING, R.A.A.F., No. 199 Sqn.
Act. Flt. Lt. H. C. L. CAVENACH, R.A.A.F., No. 156 Sqn.
Act. Flt. Lt. P. C. CORNISH, R.A.A.F., No. 83 Sqn.
Act. Flt. Lt. V. J. FERRY, R.A.A.F., No. 578 Sqn.
Act. Flt. Lt. T. E. FUERY, R.A.A.F., No. 76 Sqn.
Act. Flt. Lt. J. F. MARKS, R.A.A.F., No. 7 Sqn.
F/O. M. H. MICHAEL, R.A.A.F., No. 582 Sqn.
F/O. J. R. M. MORRISON, R.A.A.F., No. 7 Sqn.
F/O. A. M. ROBB, R.A.A.F., No. 156 Sqn.
F/O. D. W. SIMMONS, R.A.A.F., No. 61 Sqn.
F/O. G. D. SMITH, R.A.A.F., No 582 Sqn.
F/O. J. F. O'B. YOUNG, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
Sqn. Ldr. G. J. J. EDWARDS, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
Act. Sqn. Ldr. N. CRAWFORD, R.C.A.F., No. 156 Sqn.
Act. Sqn. Ldr. J. C. HOVEY, R.C.A.F., No. 415 (R.C.A.F.) Sqn.
Act. Sqn. Ldr. R. A. JACK, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
F/O. J. A. WILDING, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
F/O. W. G. WRIGHT, R.C.A.F., No. 434 (R.C.A.F.) Sqn.
P/O. R. H. DAVIS, R.C.A.F, No. 434 (R.C.A.F.) Sqn.
P/O. W. G. EVANS, R.C.A.F., No. 617 Sqn.
P/O. J. C. FLEMING, R.C.A.F., No. 49 Sqn.
P/O. J. A. G. GOUDREAULT, R.C.A.F., No 425 (R.C.A.F.) Sqn.
P/O. J. E. F. JEAN, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
P/O. A. E. LOWRY, R.C.A.F., No. 12 Sqn.
P/O. A. E. J. PAINCHAUD, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
P/O. S. D. RUDMAN, R.C.A.F., No. 100 Sqn.
P/O. J. G. STINSON, R.C.A.F., No. 434 (R.C.A.F.) Sqn.
P/O. T. P. WILSON, R.C.A.F., No. 434 (R.C.A.F.) Sqn.
F/O. D. E. HAWKER, R.N.Z.A.F., No. 630 Sqn.
F/O. J. A. PEARCE, R.N.Z.A.F., No. 97 Sqn.

Conspicuous Gallantry Medal (Flying)

W/O. H. A. CORBIN, R.A.F.V.R., No. 248 Sqn.—This officer has taken part in many sorties, several of them being attacks on enemy shipping. On these operations many vessels of varying classes have been successfully attacked despite heavy enemy opposition. Throughout, W/O. Corbin has displayed a high degree of skill, courage and determination.

Distinguished Flying Medal

Flt. Sgt. (now P/O.) E. FEATHERSTONHAUGH, R.N.Z.A.F., No. 622 Sqn.
Flt. Sgt. R. ALLEN, R.A.F.V.R., No. 76 Sqn.
Flt. Sgt. S. J H. ANDREW, R.A.F.V.R., No. 35 Sqn.
Flt. Sgt. W. H. ANSELL, R.A.F.V.R., No. 166 Sqn.
Flt. Sgt. R. LEE, R.A.A.F., No. 466 (R.A.A.F.) Sqn.
Flt. Sgt. F. V. BOGLE, R.C.A.F., No. 415 (R.C.A.F.) Sqn.
Sgt. R. L. A. ROBERTS, R.A.F.V.R., No. 578 Sqn.
Sgt. L. STAMP, R.A.F.V.R., No. 51 Sqn.
Sgt. G. D. WARD, R.A.F.V.R., No. 578 Sqn.
Sgt. (now P/O.) J. WARNER, R.A.F.V.R., No. 428 (R.C.A.F.) Sqn.
Flt. Sgt. (now P/O.) W F. BESSENT, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
Flt. Sgt. G. E. DERBYSHIRE, R.A.A.F., No. 12 Sqn.
Flt. Sgt. A. MANSTOFF, R.A.F.V.R., No. 77 Sqn.
Flt. Sgt. (now P/O.) J. K. DAVIES, R.A.F.V.R., No. 3 Sqn.
Flt. Sgt. R. C RAY, R.A.F.V.R., No 252 Sqn.
Flt. Sgt. T. W. POWELL, R.A.F.V.R., No. 9 Sqn.
Flt. Sgt. E. W. STANTON, R.A.F.V.R., No. 51 Sqn.
Flt. Sgt. A. PETERSON, R.C.A.F., No. 166 Sqn.
Flt. Sgt. R. S. RENNIE, R.C.A.F., No. 166 Sqn.
Flt. Sgt. J. A. CHALLINOR, R.A.F.V.R., No. 150 Sqn.
Flt. Sgt. A. J. DICKINSON, R.A.F.V.R., No. 18 Sqn
Flt. Sgt. R. MATTHEWS, R.A.F.V.R., No. 70 Sqn.
Flt. Sgt. D. T. MITCHELL, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
Flt Sgt. J. BEALE, R.A.F.V.R., No. 138 Sqn.
Flt. Sgt. W. F. BELSEN, R.A.F.V.R., No. 9 Sqn.
Flt Sgt. G C. SHORTLAND, R.A.A.F., No. 76 Sqn.
Flt. Sgt. K. H. SNEDDON, R.A.A.F., No. 50 Sqn.
Flt. Sgt. (now P/O.) A. W. ARMSTRONG, R.C.A.F., No. 15 Sqn.
Flt. Sgt. H. K. KAUFMAN, R.C.A.F., No. 434 (R.C.A.F.) Sqn.
Flt. Sgt. E. L. VINCE, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
Flt. Sgt. W. E. PRICE, R.A.F.V.R., No. 626 Sqn.
Flt. Sgt. M. J. THORNE, R.A.F.V.R., No. 57 Sqn.
Sgt. J. A. D. LYON, R.A.F.V.R., No. 61 Sqn.

SERVICE AVIATION

Sgt. J. W. McIver, R.A.F.V.R., No. 166 Sqn.
Sgt. J. A. Richards, R.A.F.V.R., No. 49 Sqn.
Flt. Sgt. H. Lewis, R.A.F.V.R., No. 50 Sqn.
Flt. Sgt. W. Manderson, R.A.F.V.R., No. 97 Sqn.
Flt. Sgt. E. T. Manning, R.A.F.V.R., No. 50 Sqn.
Flt. Sgt. H. Martin, R.A.F.V.R., No. 625 Sqn.
Flt. Sgt. R. Moore, R.A.F.V.R., No. 97 Sqn.
Flt. Sgt. D. S. Nicholls, R.A.F.V.R., No. 97 Sqn.

Army Awards

THE KING has been graciously pleased to approve the following awards in recognition of gallant and distinguished services in N.W. Europe:—

Military Cross

Capt. (temp. Maj.) R. M. Tarrant, Dorsetshire Regiment (attd. Army Air Corps) (since died of wounds).

Distinguished Flying Cross

Lt. (temp. Capt.) E. C. Prest, Royal Regiment of Artillery.

Distinguished Conduct Medal

Tpr. C. Jemson, Army Air Corps.

Bar to Military Medal

Sgt. E. A. Lucas, M.M., Army Air Corps.

Military Medal

Sgt. J. Goodall, Army Air Corps.
Sgt. S. Hughes, Army Air Corps.
Sgt. E. J. R. Lindores, Army Air Corps.
L/Sgt. B. Batho, Army Air Corps.
Pte. J. Glancey, Army Air Corps.
Pte. R. Kennedy, Army Air Corps.

THE KING has been graciously pleased to approve the following award in recognition of gallant and distinguished services in Italy:—

Bar to Military Medal

Sgt. H. Wilmott, M.M., Army Air Corps.

Roll of Honour

Casualty Communiqué No. 456.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list 73 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

Killed in Action.—P/O. R. K. Adam; Flt. Sgt. R. J Anderson; Sgt. G. W. Blanckley; Sgt. E. Bull; Sgt. J. A. Cruickshank; F/O. N. J. Lewis; F/O. P. S. G. Moran; F/O. A. MacK. Parker; Sgt. A. P. Tebbutt; Sgt. W. Voellner; Act. F/O. L. E. Westcott; Flt. Sgt. G. A. Wilson; Sgt. A. H. Woolfrey.

Previously Reported Missing, Now Presumed Killed in Action.—Sgt. T. G. Brady; Sgt. R. E. Burgess; Sgt. J. A. Callaway; Sgt. A. G. R. Cowdrey; Sgt. K. A. F. Davison; P/O. E. J. H. Downs; Flt. Sgt. J. F. Ellins; Sgt. T. Elliott; P/O. H. F. Farley; F/O. A. V. W. Franklin; Sgt. H. N. Gustard; Sgt. R. Hawkins; F/O. A. Honig, D.F.M.; F/O. C. Hughes; Sgt. C. Johnson; Sgt. R. T. G. Lester; Flt. Sgt. I. Lewis; Sgt. K. McDonagh; Sgt. F. Matthews; F/O. F. H. Moyniham; Flt. Lt. D. S. Pont; Sgt. G. A. Ray; Sgt. E. A. Robinson; Sgt. H. Seatter; Flt. Sgt. H. Telford.

Wounded or Injured in Action.—P/O. W. Broadley; F/O. F. S. Hulland, D.F.M.; Flt. Lt. W. Johnson; Flt. Lt. R. H. Langdon-Davies.

Missing, Believed Killed in Action.—F/O. A. G. Blake; P/O. A. J. Clark; Sgt. W. W. Forsyth; Sgt. H. V. Hunt; P/O. F. J. Parkinson; Sgt. J. Pilling; Flt. Sgt. D. J. A. W. Price; Act. Flt. Lt. H. M. Proctor, D.F.C.

Missing.—Sgt. R. I. Atkinson; Flt. Sgt. F. J. Barrett; Flt. Lt. G. C. Brown; Sgt. H. Brown; Flt. Lt. J. S. Bruce; P/O. F. F. H. Burnett; Sgt. K. C. Butcher; Flt. Sgt. T. P. Byrne; Flt. Lt. M. L. Carrick; Sgt. J. P. Cassin; Sgt. C. Cletheroe; P/O. L. W. Coghlan; Flt. Lt. E. M. Collard; Sgt. S. E. Crawley; Sgt. K. E. Croxon; Flt. Sgt. F. J. Davey; W/O. J. F. Dell; Sgt. T. Dick; Sgt. T. B. Dufty; Flt. Sgt. C. R. Dutton; Sgt. D. T. Evans; Act. Flt. Lt. P. A. I. Facer; F/O. J. Farnhill; Sgt. F. Fielder; Sgt. F. W. Flude; P/O. A. E. Fox; Flt. Sgt. D. M. Garbutt; Sgt. E. Garforth; Sgt. W. G. C. Garner; Sgt. A. Green; P/O W. J. Hardwick; Sgt. C. A. Harris; Sgt. F. G. Harris; Sgt. F. S. G. Heal; Act. Sqn. Ldr. G. C. Hemmings; Sgt. J. T. Henry; P/O. L. W. Hetherington; F/O. T. H. A. Hill, D.F.M.; Sgt. W. M. Hill; F/O. P. M. Hinves, D.F.C.; Flt. Lt. J. C. I. Hooper, D.F.C.; F/O. S. C. Hubbard, D.F.M.; Sgt. W. Huddart; Sgt. E. N. Jolley; Sgt. G. W. Joslyn; P/O. K. N. T. Monk; F/O. C. A. Kidd; F/O. G. Lawrence; Flt. Sgt. J. V. Lee; Sgt. G. H. Lilley; P/O. J. H. McCarron; F/O. A. G. MacLean; F/O. I. M. Mundy; Sgt. L. O'Toole; W/O. E. H. J. Page; Sgt. R. C. Pain; F/O. W. Pedlow; F/O. A. J. Platt; Sgt. W. Pratt; Flt. Sgt. T. J. Pye; F/O. S. J. Richards; Flt. Sgt. R. W. Robinson; Sgt. J. Rogers; Flt. Lt. S. L. Scutt; Flt. Sgt. R. Seddon; Sgt. F. P. Sharpe; Sgt. A. G. Shipton; Sgt. J. A. Slade; Sgt. E. Slater; Sgt. J. J. Starsmore; Sgt. W. J. Stephens; Sgt. A. R. B. Stewart; P/O. G. B. Stone; Sgt. R. V. Stonier; F/O P. A. Taylor; Flt. Sgt. G. Thomas; F/O. S. D. Thyagarajan; Sgt. G. W. Todd; Sgt. C. H. Townsend; Flt. Sgt. F. A. Vincent; Flt. Sgt. P. Walker; Sgt. J. Winter; Flt. Lt. N. W. Wood; Sgt. R. F. Young.

Missing, Believed Killed on Active Service.—Flt. Sgt. J. K. Flanagan.

Killed on Active Service.—F/O. E. E. V. Barwood; Flt. Lt. C. E. Bearman; Sgt. A. J. Cook; Sgt. A. L. Corlett; Flt. Sgt. R. V. Cresswell; W/O. A. W. Denton; Sgt. D. Hamer; P/O. E. Hartstein; F/O. G. D. Hamilton; F/O. C. W. Haythornthwaite; Sgt. W. Hughes; Flt. Lt. M. D. Kahn; Sgt. T. McKenna; Sgt. A. Marshall; P/O. J. Marsland; W/O. P. H. Milne; Sgt. G. Morgan; Flt. Lt. C. H. Niven; F/O. K. Oates; P/O. K. W. Organ; Sgt. F. E. Simons; P/O. B. W. Smith; Sgt. P. G. Smith; Sgt. R. Stevenson; F/O. N. D. T. Turner; L.A/C. E. D. Willcock; Sgt. K. Williams; Sgt. D. W. Wilton; Flt. Sgt. A. S. Woodbridge; F/O. A. F. Vaughan.

Previously Reported Missing, Believed Killed on Active Service, Now Presumed Killed on Active Service.—L.A/C. E. G. Harding; L.A/C. T. V. House; L.A/C. R. D. H. Jones; F/O. J. F. Mitchell; L.A/C. L. J. Nicholls; A/C.2 R. E. H. Regent; A/C.1 E. L. D'E. Roberts; L.A/C. J. Rushworth; L.A/C. W. R. Russell; Cpl. F. H. Taylor.

Wounded or Injured on Active Service.—Sgt. E. Bond; Flt. Lt. E. W. F. Hewitt, D.F.M., A.F.C.; Cpl. F. Pickersgill; Sgt. W. J. Smith; Sgt. W. Webb.

Died of Wounds or Injuries Received on Active Service.—Act. Flt. Lt. C. F. Chalk; L.A/C. J. Y. Kouraton.

Died on Active Service.—L.A/C. S. J. Anderson; Cpl. G. W. Cook; L.A/C. W. Davis; L.A/C. J. R. Hill; Cpl. W. Hughes; L.A/C. G. F. Lasbury; Cpl. P. L. Minett; L.A/C. J. L. Mackintosh; L.A/C. J. Polwarth; F/O. D. J. Stewart.

Women's Auxiliary Air Force

Died on Active Service.—A/CW.1 I. Heavyside; L.A/CW. E. Jackson; A/CW.1 I. B. Sulter.

Royal Australian Air Force

Previously Reported Missing, Now Presumed Killed in Action.—Flt. Sgt. D. B. Aberle; Flt. Sgt. C. MacL. Brigden; P/O. L. M. Dargie; W/O. F. M. Cox; W/O. W. J. Doude; W/O. R. M. Edmonds; W/O. N. S. Ferguson; P/O. M. J. Freeman; Flt. Sgt. G. J. Gebbie; Flt. Sgt. J. G. Gibson; F/O. A. W. Gunson; P/O. L. J. Hinton; Flt. Lt. P. C. C. Kerr; Flt. Sgt. J. D. Malcolm; Flt. Sgt. W. F. J. Manning; F/O. J. N. Morris; Flt. Sgt. G. E. Potter; Flt. Sgt. F. Pullom; Flt. Sgt. J. K. Read; F/O. C. G. Slennett; P/O. H. R. Vincent.

Missing.—W/O. M. A. Baxter; Flt. Sgt. G. G. Collard; P/O. D. G. Charlick; Flt. Sgt. A. W. Farrer; Flt. Sgt. F. J. Geddes; P/O. W. Hough; W/O. J. F. Moore; Flt. Sgt. J. Shields.

Killed on Active Service.—W/O. G. L. Allan; W/O. W. A. Graham; W/O. K. J. Knodler; F/O. J. A. Peterson; F/O. T. Stephens.

Royal Canadian Air Force

Killed in Action.—Sgt. E. G. Beard; P/O. J. L. W. Bilodeau; W/O. G. V. A. Butchart; Flt. Sgt. F. W. Crawley; W/O. W. H. Ferris; Flt. Sgt. J. J. Grant; F/O. H. Slater.

Previously Reported Missing, Believed Killed in Action, Now Presumed Killed in Action.—Flt. Sgt. F. Sheehan.

Previously Reported Missing, Now Presumed Killed in Action.—F/O. J. B. Bowden; F/O. C. G. Bruton; F/O. J. D. L. Cloutier; F/O. E. W. Dickinson; F/O. M. J. Dowd; F/O. J. E. Fisher; W/O. G. C. McKay; Sgt. M. G. McKibbon; Flt. Sgt. W. R. McLellan; F/O. H. M. Park; W/O. J. T. Roach; Flt. Lt. C. C. Stovel, D.F.C.; Sgt. K. C. Windsor.

Wounded or Injured in Action.—W/O. J. L. Howell.

Missing, Believed Killed in Action.—Flt. Lt. A. E. Miron; F/O. W. H. Morrison; F/O. G. Scott.

Missing.—F/O. J. L. Baillargeon; Flt. Sgt. T. L. Baker; Flt. Sgt. J. H. Batt; P/O. B. Bercuson; W/O. F. D. Billingsley; F/O. D. J. Block; Sgt. K. G. Boucock; Sgt. R. R. Boyce; F/O. H. W. Boyle; P/O. R. A. Brett; F/O. D. W. Brown; F/O. L. G. Brown; Flt. Lt. W. W. L. Brown; F/O. M. B. Calhoun; P/O. J. W. Carter; W/O. R. E. Clarke; W/O. J. B. Cleaver; F/O. J. R. O. Clerc; Flt. Sgt. P. A. Crowley; F/O. T. H. Dahle; F/O. R. H. Davies; Sgt. A. W. J. Drennan; Sgt. M. E. Fairall; F/O. W. C. Fairgrieve; Sgt. J. Faragher; F/O. C. H. Fisher; F/O. M. H. Fleming; W/O. G. E. Germiquet; F/O. F. C. Goring; F/O. H. Grimble; Flt. Sgt. J. R. Hunter; Flt. Lt. K. D. Kemp; F/O. A. Koziol; Flt. Sgt. W. A. Lamb; W/O. D. B. Lorenz; Flt. Lt. H. D. F. MacAllister; F/O. R. F. G. McCurdy; Flt. Sgt. J. W. Moffat; F/O. F. W. Moffit; F/O. J. A. W. Morgan; P/O. H. A. Murphy; P/O. P. A. Musgrave; P/O. K. A. Nordheimer; F/O. C. F. O'Donnell; F/O. G. F. Pritchard; Flt. Sgt. P. C. Revell; Sgt. A. G. Roski; Flt. Sgt. J. G. M. Savard; Flt. Sgt. M. Sawry; F/O. G. H. Sharpe; Sgt. D. E. Snell; F/O. J. E. Spraggett; F/O. J. C. Sprott; F/O. J. R. G. Sprigley; P/O. C. R. Stewart; F/O. A. Steinstra; W/O. C. P. Surles; P/O. J. A. Tolmie; Flt. Lt. J. C. Valk; Flt. Lt. S. K. Walker; Flt. Sgt. G. E. Wiyte.

Killed on Active Service.—W/O. F. Bradley; F/O. J. G. King; F/O. H. H. Lively; F/O. N. H. Moysey; W/O. M. Regenstreif.

Previously Reported Missing, Now Reported Killed on Active Service.—W/O. J. A. Pollock.

Died of Wounds or Injuries Received in Action.—Sgt. K. T. Bielby; F/O. W. B. Rosen.

Royal New Zealand Air Force

Previously Reported Missing, Now Presumed Killed in Action.—F/O. B. J. K. Hannah; P/O. N. T. Newton.

Missing.—F/O. J. A. Dale; Flt. Sgt. L. Dunn; P/O. R. B. Ede; F/O. J. A. Fleming; Flt. Sgt. J. M. Hart.

Killed on Active Service.—F/O. E. O. W. McConnel.

South African Air Force

Missing.—W/O. I. Bezuidenhout; Lt. F. N. Edmonstone; Lt. W. A. Gale; 2/Lt. R. L. Lawson; Lt. A. D. Stott; Capt. C. S. Van Heerden; Lt. F. J. Wilkinson; W/O. D. A. Wooldridge.

ALLIED VISITOR: Sgt. W. W. Wilson explains the instrument panel of an 8th U.S.A.A.F. Thunderbolt to Peter Hall of the Cambridge A.T.C.

SERVICE AVIATION

Casualty Communiqué No. 457

Of the names in this list, 71 are second entries giving later information of casualties published in earlier lists

Royal Air Force

KILLED IN ACTION.—Sqn. Ldr. W. D. W. Bird; Flt. Sgt. G. W Brown; W/O. G. T. Collinson; Sgt D. W. Elmes; Sgt. J. A. Fraser; Sgt F. W. Hudson; Sgt. R. W. Meadows; Sgt. D. A. Mills; W/O. K. V. Pole; Flt. Sgt. R. H. Pool; Flt. Sgt. W. J Roberts; Sgt. E. H. Swanston; Sgt. D. A. E. Taylor; Sgt. R. C. Wilson; Sgt. L. W. Youens.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. D. H. W. Little; F/O. R. C. Williams.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sqn. Ldr. K. A. Aldridge, D.F.C.; Flt. Sgt. T. L. Anderson; Sgt. D. R. Bailey; Sgt. E. C. Beacock; F/O. J. Bell, D.F.M.; Sgt. D. Bumfrey; F/O. R. Butler; Flt. Lt. D. J. Brill; Sgt. H. Chappell; Sgt. G. M. Coggans; F/O. F. A. Collins; Sgt. G. H. Cooper; P/O. J. E. Cox; Sgt. P. J. Deveney; Sgt. J. S. Edwards; P/O. L. J. Ellis; Act. Sqn. Ldr. R. E. Fawcett, D.F.C.; Sgt. R. L. Gill; F/O. J. Hampton; Sgt. L. S. Harris; Flt. Sgt. P. C. Hinks; Flt. Sgt. T. E. Hooper; Sgt. K. G. V. Keir; Sgt. D. N. Lambert; Sgt. R. McCormick; W/O. J. McMorland; Flt. Sgt. A. N. Partington; Sgt. H. R. Peel; Sgt. J. D. Scott; Sgt F. H. Scraton; Sgt. W. R. Silcocks; Flt. Sgt. N. Smith; P/O. J. W. Snook; Sgt. J. Stone; Sgt. J. C. Tetley; Sgt. W. H. Thornhill; Sgt. W. H. Veale; P/O. P. V. Wilson.

WOUNDED OR INJURED IN ACTION.—Sgt. F. J. Curtis; Sgt. L. Dagnall.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. N. Jameson; Sgt. D. L. Whitbread.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. L. A. Ryan; F/O. J. E. Walton; P/O. R. Welch.

MISSING.—F/O. R. D. Ackers; P/O. F. C. Allford; Act. F/O. J. P. Austin Flt. Sgt. E. A. Batterbee; Flt. Lt. C. F. Bedell, D.F.C.; F/O. G. Beresford; P/O. R. G. Blackburn; P/O. B. F. Blatchford; Flt. Sgt. R. H. Bloomfield; F/O. W. T. Bolt; Sgt. R. Brown; Sgt. W. T. Bussell; F/O. K. S. Carr; Sgt. A. J. Cherry; Act. Sqn. Ldr. R. C. Chopping, D.F.C.; W/O. B. Clark; Flt. Sgt. E. W. Clark; Flt. Sgt. J. D. Clarke; Sgt. A. Clayworth; Sgt. E. L. Colley; P/O. R. G. Collinghan; Flt. Sgt. E. T. Cornelius; Sgt. R. S. Darling; Sgt. S. J. Davis; F/O. E. R. Durant; W/O. L. J. Eardley; Sgt. F. W. Evered; Sgt. R. H. Finlayson; Flt. Sgt. T. O'C. Fitzgerald; Sgt. C. E. Foreman; Sgt. E. G. Fretwell; Sgt. R. W. M. Fulford; P/O. B. B. Furniss; Flt. Sgt. K. C. Garner; Flt. Sgt. J. C. Gay; Sgt. R. G. Glanville; W/O. J. R. Gordon; Sgt. W E. Guy; F/O. L. A. Hall; Sgt S. Hamilton; P/O. A. Hargrave; Sgt. R. Harwood; Flt. Lt. J. K. Haselden; Sgt. P. F. Heath; Flt. Sgt. J. Henderson; Sgt. S. F. Horne; Flt. Sgt. K. J. Johnson; Sgt. D. G. Jones; W/O. G. M. Jones; F/O. E. A. L. Kemp, D.F.C.; Flt. Lt. K. E. Kimber; Sgt T. Law; P/O. M. S. Layton-Smith; Flt. Sgt. G. T. Lewis; Flt. Sgt. J. F. Lewis; Flt. Sgt. W. R. Love; Sgt. H. L. Lyne; Act. Flt. Lt. P. G. McCarthy; Sgt. A. Mackay; Flt. Sgt. H. V. McLanachan; Flt. Sgt. D. J. Maguire; F/O. C. J. F. Marchand; Sgt. N. Marley; F/O. A. Martin; Sgt. H. P. Martin; Flt. Sgt. W. R. O. Matthews; Sgt. J. H. Moule; Sgt. M. T. Mountain; F/O. R. H. Munsey; P/O. F. C. Newman; Sgt. H. E. Newman; Sgt. N. H. A. Osmond; Sgt. F. G. Owen; Flt. Sgt. A. W. Pope; Sgt. J. E. Porter; Sgt. P. J. Potts; W/O. A. T. Raine; Sgt. A. J. Rampley; P/O. P. S. M. Robinson; Sgt. K. C. Richards; Flt. Lt. A. J. Rippon; Sgt. M. J. Robertson; Sgt. P. H. Roots; P/O C. M. Rosay; Flt. Sgt. W. Ross; Sgt. B. L. Rowland; Flt. Sgt. E. Rudge; F/O. C. R. E. Russell; Sgt. R. H. C. Scott; Sgt. B. Sellers; Sgt. A. Sharpe; P/O. A. V. Simmons; Flt. Sgt R. Smellie; Sgt. F. Smith; Sgt. G. H. Smith; Sgt. K. Smith; F/O. L. G. Stamp; Sgt. A. W. Taylor; Sgt. C. W. Taylor; Flt. Sgt. E. C. Thyer; Flt. Sgt. L. R. Tout; Flt. Sgt. S. G Turner; P/O. W. N. Wait; Flt. Sgt G. N. Waller; Sgt. K. G. Webb; P/O. R. F. Wheatley; P/O. E. R. White; Act. F/O. G. G. Whyte; Sgt. J. F. Wright; Flt Lt. W. D. Wright.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. J. H. Anderson; P/O. L. W. Chapman, D.F.M.; A/C.1 I. V. J. Collett; Flt. Lt. A. G. Edwards; Flt. Sgt. N. E. Hodges; L.A/C. J. A. B. McIntosh; Sgt. H. W. J. Mitchell; Cpl. H. Newstead; Flt. Sgt. A. A. O'Connor; P/O. D. V. Randall; L.A/C. J. Rathbone; F/O. W. H. Wagstaff.

KILLED ON ACTIVE SERVICE.—F/O. F. W. Cawthorne; Flt. Sgt. J. W. E. Cooper; Sgt. H. Cowan; Sgt. R. Fare; Flt. Sgt. W. D. Harper; P/O. J. E. A. Homes; Sgt M. M. Lyon; Sgt. A. K. H. MacLennan; Sgt. W. C. Norcross; Sgt. R. C. Norton; Sgt. B. J. Roff; Sgt. W. B. Smith; Sgt. D. R. Trask.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. R. S. Sellars.

DIED ON ACTIVE SERVICE.—A/C.2 W. V. Armstrong; Act. Sqn. Ldr. R. W. Atkinson, D.F.C.; Cpl. C. Clow; Sgt. W. F. Cooper; Cpl. E. R. Dolan; Act. Cpl. E. R. Guest; A/C.2 S. Lockley; L.A/C. P. Lowe; A/C.1 J. McSorley; L.A/C. G. Mossman; L.A/C. W. Shipper.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. N. S. Alkemade; Sgt. E. Sawyer; F/O. S. Smith.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—Act. S/O. M. T. Byck.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. R. W. Sinden.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. C. N. Black; P/O. J. Y. Clarke; P/O. D. R. Rich; P/O. R. McC. Simpson.

MISSING. W/O. R. J. H. Adcock; Flt. Sgt. J. A. Boatswain; P/O. L. E. Faithorn; Act. Flt. Lt. A. H. Hammett; Flt. Lt. J. P. Liversidge; Act. Flt. Lt. F. E. McLean; F/O. R. W. Mercer; Flt. Sgt. K. A. Pavey; F/O. N. H. Port; Flt. Sgt. L. J. Smith; Flt. Sgt. H. Stenhouse; W/O. P. Sturges.

KILLED ON ACTIVE SERVICE.—P/O. J. Beebar; F/O. D. C. Forman; W/O. F. W. Handley; W/O. R. E. Jackson; F/O. J. K. Newth; F/O. C. C. Swire.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. J. R. Harrison; Flt. Sgt. S. J. Levesque; Flt. Lt. J. W. F. Peacock.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. S. W. F. Baker; Sgt. J. T. Costello; Flt. Sgt. E. V. Davidson; Flt. Sgt. J. R. Goodwin; Sgt W. H. Green; F/O. W. H. Hamilton; Flt. Sgt. W R. R. Shore; Sgt. W E. Stinson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. A. W. Dungate; W/O. W. Hill, D.F.M.; W/O. G. P. Lowle; F/O. R. A. Pildrem; W/O. W. E. Raban; Sgt. J. E. Redmond; Flt. Sgt. A. E. Slegg; Flt. Sgt. G. S. Taylor.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. J. C. Hanna; F/O. I. G. D. Mills; F/O. E. T. Widenoja.

MISSING, BELIEVED KILLED IN ACTION.—F/O. P. E. Cronin; F/O. D. G. Stevenson; W/O. C. B. Sutton.

MISSING.—F/O. D. A. Adams; F/O. J. S. Beresford; P/O. R. G. Brueg.man; Flt. Lt. T. A. Bugg; Flt. Sgt. E. F. Christy; W/O. R. S. Ferguson; Flt. Sgt. V. C. Gerrie; F/O. H. G. Gilchrist; F/O. F. O. Gilmore; Sgt. W. B. Gracie; Flt. Sgt. R. G. Grout; F/O. R. McK. Habkirk; F/O. W. R. Heuchert; F/O. J. A. Kelly; P/O. T. E. Lee, F/O. J. Leonard; F/O. M. McAulay; F/O. G. D. MacRae; Flt. Sgt. J. M. McLeod; F/O. G. G. Perkins; Flt. Sgt. S. L. Peters; P/O. R. A. Reed; Sgt. J. J. Ringer; F/O. J. M. Robertson; F/O. G. T. Schwalm; F/O. W. Stephens; Flt. Sgt. R. E. Sutherland; Flt. Sgt. H. D. Thomson; Sqn. Ldr. G. P. Vickers; Flt. Lt. G. P. Wyse; P/O. G. J. Young.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. F. MacD. Anderson; P/O. L. M. Brehaut; Flt. Lt. A. R. Carter, D.F.C.; Sgt. J. R. Clarke; F/O. W. W. Cooper; Flt. Sgt. A. Di Pesa; Flt. Sgt. N. Dlusy; F/O. R. W. Fulton; F/O. T. C. Kewen; Sgt. W. Komer; Sgt. J. J. Lee; W/O. R. J. Love; W/O. L. H. Luddington; Flt. Lt. R. L. Mercer; W/O. W. D. Murdie; F/O. R. S. Rowson; Flt. Lt. W. B. Sargent; P/O. V. C. Stordy; F/O. A. N Unsel; Sqn. Ldr. R. S. Weir; P/O. P. A. Whyte; P/O. T. B. Wood.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. M. Antifaev; W/O. N. Butts; Sgt. D. S. Champion; F/O. M. E. O'Donoghue; F/O. J. W. Roussel; Flt. Sgt. G. F. Smith.

WOUNDED OR INJURED ON ACTIVE SERVICE.—P/O. D. N. McTavish.

Royal New Zealand Air Force

MISSING.—P/O. E. G. Robinson; W/O. I. W. Trainor.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—F/O. F. A. Sanderson.

South African Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Lt. C. L. Garlick.

WOUNDED OR INJURED IN ACTION.—Lt. H. P. Freeman.

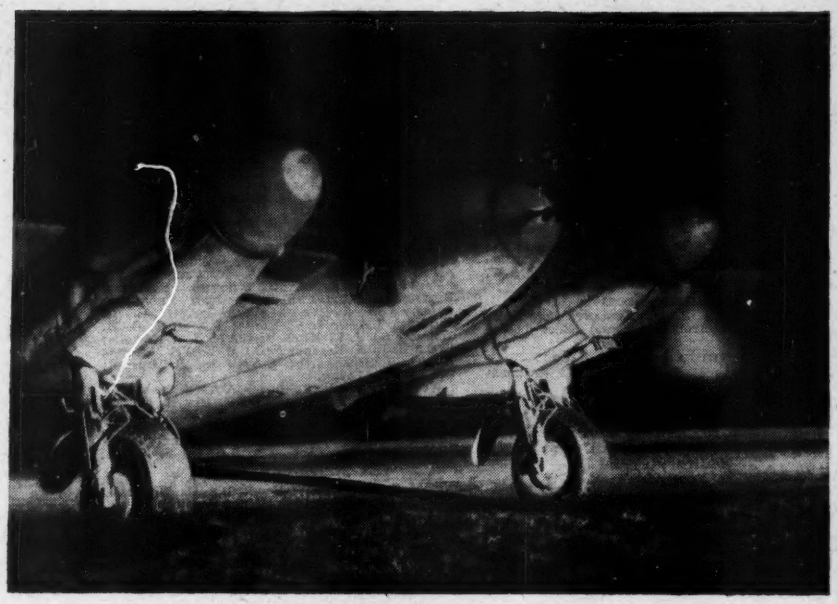
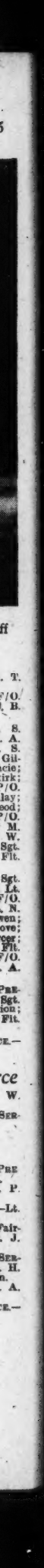
MISSING, BELIEVED KILLED IN ACTION.—Lt. R. G. Jennings.

MISSING.—2/Lt. P. G. Coutts; Lt. K. Fairweather; W/O. B. D. B. Hayes; W/O. I. C. J. Jansen; Lt. V W Westlake.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. R. Boraine; Lt. J. L. Caro; Lt. J. H. Glenny; Sgt. R. Hosmel; Lt. G. C. Pennington.

KILLED ON ACTIVE SERVICE.—Air Mech. R. A. Garrow; Lt. C. J Schutte.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Lt. R. A. Hargrave.



BY CHANCE : A Mosquito VI, illuminated by the Chancelight, taxies out to the take-off point.